

<i>The Town of Fort Frances</i>	<b>SECTION</b> OPERATIONS AND FACILITIES
<b><u>STANDARD OPERATING PROCEDURE</u></b> <b><u>FOR THE DISINFECTION OF WATER</u></b> <b><u>MAINS</u></b>  <b><u>POLICY</u></b>	<b>REVISED</b>  July 2004
Resolution No. 305 07/26	Supercedes Resolution No.
Policy Number 4.9	<b>PAGE 1 of 4</b>

**1. PURPOSE:**

To provide a procedure which outlines the events and responsibilities of Town employees for the disinfection of water mains.

**2. RESPONSIBILITY:**

All individuals in the Operations & Facilities Division workforce, at all levels and functions, are responsible for understanding and carrying out the responsibilities and duties outlined in the policy.

**3. PROCEDURE:**

**A. GENERAL:**

- i. This Best Practice have been developed after review and taking into consideration of the Best Practices developed in the industry by the following organizations: Water Environmental Federation (WEF), American Water Works Association (AWWA), Ontario Water Works Association (OWWA), National Research Council (NRC) and the Canadian Water and Wastewater Association.
- ii. All new water mains and parts, water mains taken out of service for inspection, repairs as well as after swabbing or pigging operations must be disinfected with some form of chlorine before put in use. The common forms of chlorine that are used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granules or tablets. The Town has adopted the use of sodium hypochlorite solution as the disinfection agent to be used.
- iii. Notify the Water Treatment Plant Operator(s) of which water mains will be disinfected.

**B. GUIDELINE:**

- i. Depending on the time limit available to isolate the water main, the chlorine contact time and dosage of FAC (free available chlorine). These two factors will

vary depending on the specific conditions of the water distribution system in question. A general rule of thumb is;

- New installation – 50 mg/l of FAC for a 24 hour contact period
- After a swabbing or pigging event – 300 mg/l of FAC for a 3 hour contact period

ii. In both cases, sodium hypochlorite solution will be used as the disinfection agent. The disinfection agent will enter into the isolated water main through the means of a fire hydrant and be allowed to fill the water main from only one direction. Also, water will be discharged only from one fire hydrant.

iii. The following steps are to be followed:

New installations:

- Isolate the water distribution system, which requires disinfecting.

After a swabbing or pigging event:

- Once the maintenance work plan has been finalized, the water distribution operator will immediately notify the affected water users of the maintenance activity, and once the maintenance work has been completed, a boil water advisory be put in effect until further notice. The event will be communicated by means of delivering the standardized notification form to the customers.
- The water distribution operator in charge will isolate the water distribution system, which requires disinfecting. This task will be completed by turning isolation valves to the “off” position in accordance with the contingency plan for operating isolation water main valves.

New installations and after a swabbing or pigging event:

- Determined the volume of the water in the isolated water main.
- Calculate the flow rate from isolated water main where the discharge fire hydrant will be.
- Calculate the flow rate of the disinfection injection pump being used.
- Mix the sodium hypochlorite and water in the mixing barrel.
- Inject the sodium hypochlorite solution and water into the isolated water main.

- Once the volume of water to completely turn over in the isolated water main, verify that the concentration of FAC has reached the discharge hydrant.
- Shut down injection system.
- Allow the isolated water main to sit for required contact period of 24 hrs. or 3 hrs.
- For new water main installations, at the end of the contact period verify the concentration of the chlorinated water to ensure that the residual is not less than 10 mg/L of free chlorine. If less than 10 mg/L the disinfection process will have to be redone.
- Once the chlorination process has been completed the water main is to be flushed of the chlorinated water. Chlorinate water will be diluted and discharged into a sanitary sewer collection system.
- De-chlorination of the chlorinated water may be necessary depending on the location of the nearest sanitary sewer.
- Verify that the FAC residual from the discharge fire hydrant is within normal operating conditions.
- For swabbing or pigging events only; position the isolation valves in the open position.
- Bacteriological testing of the water is to be done in accordance with “Standard Operating Procedure for Bacteriological Testing for Water Mains”.
- Once positive water samples are received indicating that the water is safe for consumption, the water main can be put into service and water users notified that the water is safe for consumption.
- The water distribution operator in the water distribution logbook will log all pertinent information regarding the disinfectant event. Also, information will be recorded on the water distribution plans attached to the walls in the Operations & Facilities Division – Public Works Office. (See Appendix F; Water Main Disinfection Report).

For further information please refer ANSI/AWWA C651-99 “Disinfecting Water Mains” for more information.

## CHLORINE DOSAGES FOR DISINFECTING WATER MAINS

The following table represents the amounts of Sodium Hypochlorite required to produce various chlorine concentrations in 100,00 gal. (378.5 m<sup>3</sup>) of water.

Desired Chlorine Concenc in Water mg/L	Liquid Chlorine Required kg.	Sodium Hypochlorite Required 5% Available Chlorine (L)	Sodium Hypochlorite Required 10% Available Chlorine (L)	Sodium Hypochlorite Required 15% Available Chlorine (L)
2	.77	14.7	7.6	4.9
10	3.76	73.4	37.5	25.4
50	19.05	367.2	187.8	126.4

Note: Amounts of sodium hypochlorite are based on concentration of available chlorine by volume. If you have poor storage practices or have old amounts of chemicals, this may impact your available chlorine for use.

The following table shows the amounts of Sodium Hypochlorite required to produce chlorine concentration of 200 mg/L in various amounts of water.

Volume of Water		Liquid Chlorine Required		5% Available Chlorine		10% Available Chlorine		15% Available Chlorine		Calcium Hypochlorite 65%
US gal	(L)	lb.	(g)	US gal	(L)	USgal	(L)	US gal	(L)	(kg)
10	(37.90)	.02	(9.1)	.04	(.15)	.02	(.08)	.02	(.08)	(13.6)
50	(189.3)	.1	(45.4)	.2	(.76)	.1	(.38)	.07	(.26)	(68)
100	(378.5)	.2	(90.7)	.4	(1.51)	.2	(.76)	.15	(.57)	(136.1)
200	(757.1)	.4	(181.4)	.8	(3.03)	.4	(1.51)	.3	(1.14)	(272.2)