The Town of Fort Frances	**SECTION** OPERATIONS AND FACILITIES
Standard Operating Procedure for De-chlorination **POLICY**	**REVISED** July 2004
Resolution No. 305 07/26	Supercedes Resolution No.
Policy Number 4.10	**PAGE 1 of 3**

1. PURPOSE:

To provide a procedure which outlines the events and responsibilities of Town employees for the de-chlorination of highly chlorinated water.

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 Highly chlorinated water that is present during flushing and disinfection can be toxic to aquatic organisms. It is imperative that the disposal of this water does not adversely affect the local receiving waters. De-chlorination is a process of neutralizing the chlorine residuals from the water.

iii. Notify the Water Treatment Plant Operator(s) and Sewage Treatment Plant Operator(s) of any de-chlorination process.

B. GUIDELINE:

Chlorinated water can be discharged to:

i. Sanitary Sewers - This is a safe practice as long as the volume is not too great and there is a good distance between the point of application and the treatment plant. The Plant must be contacted to ensure the operation is not hampered by the addition of this loading and the chlorine residual.

ii. Receiving Waters - (including storm sewers) - Water with a free chlorine residual should not be discharged directly to a lake or stream. If measuring residuals, the combined residuals at the edge of the mixing zone (where allowed) should be below .002 mg/L of combined residual.

iii. Drainage Ditch - Discharge to an open ditch is a good alternative especially if the point of addition is a considerable distance to the receiving water and the ditch in unlined and is full of organic material. Sunlight and high temperatures will help to dissipate the chlorine quickly.

If the above conditions cannot be met, a slow discharge of the chlorinated water can be directed into a sanitary sewer.

If de-chlorination is required, the amounts can be determined using the information below:
Excess Chlorine Residual 'X' Factor = De-chlorination Chemical Required

This can be worked out in mg/L, lb. or whatever units are appropriate.

There are five chemicals that can be used to de-chlorinate the water:

- Hydrogen Peroxide (H_2O_2) - Factor = 0.479 - This is probably the best chemical when discharging to an environmentally sensitive watercourse. It is cheap and an overdose will only add more oxygen to the stream.
- Sulfur Dioxide (SO_2) - Factor = 0.901 - This chemical is cheap but will slightly lower the pH in the receiving water.
- Sodium Thiosulfate ($Na_2S_2O_3$) - Factor = 2.225 - This is usually in a crystal format and is easy to use. This will cause some sulfur turbidity but in excess is harmless.
- Sodium Sulfite (Na_2SO_3) - Factor = 1.775 – In excess will lower the dissolved oxygen in the stream.
- Sodium Hyposulfite ($Na_2S_2O_4$)(sodium metabisulfite) - Factor = 1.3 – In excess will lower the dissolved oxygen in the stream.

Note: All chemicals listed above have a requirement for personal protective equipment. Please ensure that all staff handling these products has read the MSDS and review safety procedures.

Refer to the MOE Bulletin 65-W-4, Chlorination of Potable Water Supplies.

Example Calculations:

You have a water main that contains a chlorine residual of 21 mg/L and the volume in the pipe that has been disinfected is 11,000 L (2400 gal). You are able to discharge to a dry drainage ditch that travels some length till it reaches a watercourse. You figure that by reducing the residual to 1 mg/L, you will have effectively eliminated all residual by the time this water travels through the ditch. The chemical you choose is Hydrogen Peroxide at a factor of 0.479.

Dosage required to neutralize 20 mg/L residual would be:
20 mg/L x 0.479 = 9.6 mg/L

To figure out how much chemical you need you have to times this number by the volume of water?
9.6 mg/L x 11000 L = 105600 mg or 105.6 mg of Hydrogen Peroxide (H_2O_2)

In order to figure out the liquid volume of the chemical required, you need to know what % the chemical strength is and what the specific gravity is:

For Commercial grade hydrogen peroxide - normally 35% strength and a specific gravity of 1.12 g/ml

$$105.7\ \text{gm} \times \frac{100}{35} \times \frac{1}{1.13} = 267\ \text{ml of concentrate.}$$