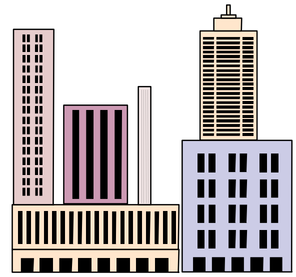
MUNICIPAL WATER USE GUIDELINES

For Release of Municipal Tap Water to the Environment



INTRODUCTION

The Greater Vancouver Regional District (GVRD) has initiated a secondary disinfection program for municipal tap water that is distributed to its 18 Water District member municipalities. This program has been initiated to ensure that the water supply meets the current health guidelines set forth by the provincial Health Act - Safe Drinking Water Regulation (1992).

In the early 1990's, a comprehensive Environmental Impact Assessment evaluated the use of both chlorine and chloramine as a secondary disinfectant. Through an extensive public consultation process in 1994, chlorine was chosen as the most favourable option. Ozone cannot be used because it breaks down too quickly. The public said they preferred the use of chlorine over chloramine because it presents a lower risk to the environment - even though chlorine will cost more and may add a chlorine taste and odour to the water.

In choosing chlorine over chloramine, the GVRD has already provided its water users with a first step in mitigating the impacts of potable water discharges by selecting a secondary disinfectant with a lower potential impact

Initially, all municipal tap water in the GVRD is chlorinated at the source reservoirs. However, as the water flows through the distribution systems, the chlorine level decreases due to reactions with organic matter and other materials present in the water and the pipe. With this decrease, there is an increased opportunity for bacteria growth.

To reduce this growth, the GVRD plans to add chlorine at a number of rechlorination stations located throughout the region.

Increased chlorine levels in the municipal water supply also means an increase in risk to the aquatic receiving environment in the GVRD. The level of chlorine that will be present in chlorinated tap water (as high as 1.0 milligram of chlorine per litre of water) is toxic to fish and other aquatic organisms. Therefore, if tap water is released directly to the environment with no treatment, there is a potential for environmental impact.

To address this environmental risk, the GVRD has developed Guidelines for managing releases of tap water for various types of activities. These Guidelines outline measures that can be taken to avoid releasing tap water directly to local water bodies and provides methods for treatment of this water prior to its release.

For ease of discussion, chlorinated municipal tap water is referred to as simply tap water throughout this document.

Guidelines are available for the following categories:

- ❐ Construction Water Use
- ✔ Municipal Water Use
- ❐ Domestic Water Use
- ❐ Agricultural Water Use
- ❐ Industrial/Commercial Water Use

WHO SHOULD READ THIS DOCUMENT?

This Guideline has been developed for municipal staff who are involved in activities that could result in the release of tap water to the environment. Some examples of the type of activities that could result in a release of tap water to a local water course include:

- ➢ road cleaning
- ➢ water main flushing
- ➢ water main breaks
- ➢ reservoir cleaning
- ➢ reservoir overflows
- ➢ lawn watering at parks
- ➢ fire fighter training/fire fighting
- ➢ water parks

Approaches to managing releases of tap water are provided in this Guideline document.

POTENTIAL IMPACTS TO THE ENVIRONMENT

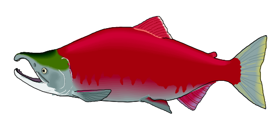
If tap water enters a water body, it has the potential to kill fish, and other aquatic organisms due to the presence of chlorine in the water. The chemical mechanism by which chlorine affects fish is not completely understood. One mode of action is likely through damage to the gill membranes thus preventing the fish from breathing.

The potential impact from a release of tap water will depend on a number of factors such as the volume of water released, the concentration of chlorine in the water, the proximity to a water body, and the available dilution capacity in the water body. The greater the volume of chlorinated water released to the environment, and/or the greater the concentration of chlorine, the greater the risk of impact, particularly to small streams, which may not have the ability to dilute the release.

The nature of the receiving environment will also have an influence on the potential impact of a tap water release. Chlorine is an oxidant and will react very quickly with a range of materials that may be present in the water, such as organic matter. This means that some bodies of water may show no effect from a spill of tap water because neutralizing materials are present, while release of tap water to another water body of similar size may have an impact. Generally, as the organic content and/or suspended solids content of a water body increases, the ability to neutralize chlorine also increases.

Due to the number of factors that must be taken into account, it is very difficult to predict what effect a spill of tap water will have on the receiving environment. Because of this, it is more prudent to appropriately manage releases of tap water and take preventative measures to ensure the protection of the environment.

REGULATORY CONSIDERATIONS



The Province of British Columbia has established ambient water quality criteria for chlorine levels in fresh and marine waters. The criteria have been developed based on the length of time of exposure to chlorine and are defined in terms of Total Residual Chlorine (TRC) levels. TRC includes all forms of chlorine which are able to act as an oxidant.

The criteria are set for both continuous and intermittent exposures. For example, the criterion for continuous exposures in freshwater is 0.002 mg/L (ppm). However, the criterion for maximum intermittent exposures is as high as 0.1 mg/L. The following are some examples of the criterion for different durations of exposure:

Duration of Exposure (Minutes)	Allowable CPO[1] in Marine and Estuarine mg/L	Allowable TRC in Freshwater mg/L
≤ 0.2	0.04	
≤25		0.1
30	0.005	0.087
90	0.003	0.038
>120 continuous criterion	0.003	0.002

[1] Chlorine produced oxidant - Approved and Working Criteria for Water Quality, Ministry of Environment, Lands and Parks, (1995).

These criteria mean that tap water discharged to a water body should not result in the chlorine level in the water body exceeding the criteria. For example, if the chlorine concentration in the tap water is 1 mg/L, the tap water will need to be diluted more than 500 times to meet the ambient chlorine criterion of 0.002 mg/L for exposures of greater than two hours.

Federal Fisheries Act

The federal *Fisheries Act* is administered by the Department of Fisheries and Oceans to protect fish and fish habitat. The Department of Environment (DOE) has the lead administrative authority for the pollution prevention section of the *Fisheries Act*. Charges can be laid under the *Fisheries Act* if one allows the deposit of a deleterious substance into any waters that fish depend upon either directly or indirectly in order to carry out life processes. For example, a section of a stream may not directly contain fish, but may support food organisms which the fish consume. In most circumstances, tap water containing chlorine may be considered a deleterious substance and fines could be levied with its release.

GENERAL AWARENESS

First Steps

The first step in managing releases of tap water is to understand the location of the water source in relation to the surrounding aquatic resources and to identify the activities that present a risk to these resources. Key factors that affect the potential environmental risk from a release of tap water are:

- The proximity of the site to a water body;
- The aquatic resources at risk in the water body;
- Potential volumes of water that can be released from the site;
- The size or flow of the nearest water body; and
- The chlorine concentration in the tap water.

Unless chorine monitoring indicates otherwise, it should be assumed that there is chlorine residual in tap water sufficient to cause environmental impact.

Location of Site

To determine the potential risks of using tap water at a site, the following should be determined:

- the distance to the nearest water body such as a stream, creek or lake;
- any significant environmental features in the local water body such as a hatchery;
- the flow path of a release from the site to the water body (eg. overland or through a storm water system);
- the likely discharge point of the flow; and
- the size or flow of the water body.

Because of the nature of drainage in the greater Vancouver region, it would be prudent to assume that fish are present in a local water body unless it has been confirmed otherwise. Even if fish are not present, it is likely that this water body provides fish food organisms to a downstream fish resource and, thus, still needs protection from a release of tap water.

Information on aquatic resources can be obtained from the Ministry of Environment, Lands and Parks, and the Department of Fisheries and Oceans.

Sites within 100 m of a natural drainage, or with direct discharge to a water body should be considered as high risk. The risk tends to decrease with distance to the water body but the potential impact is very dependent on the route the water takes (eg. overland flow versus storm water system).

Overland flow provides the most protection as the chlorine will react with dirt and vegetation as it comes into contact with it. The storm system does provide some buffering of the flow and can dissipate some of the chlorine, but these systems generally are a more direct link to a local creek.

❑ *The proximity of a site to an environmentally sensitive area, the volume of water released from the site, and the concentration of chlorine in the water are all key factors in determining environmental risk.*

Volume of Water

The most prudent step will be to use as little water as possible which conforms with the GVRD's Water Conservation Program.

Obviously, the higher the volume of water used at the site, the greater the risk. For instance using a garden hose to wash equipment does not present the same risk as using a high pressure fire hose for the same purpose.

A 2 cm (3/4") garden hose discharges water at a relatively low rate of approximately 114 L/min (25 gpm) as compared to a 10 cm (4") fire hose which can discharge water at a rate of up to 2275 L/min. (500 gpm). After one hour, the garden hose will discharge 6825 litres (1,500 gallons) of water while the fire hose will discharge 136,500 litres (30,000 gallons) of water.

❑ *It is important to understand the activities that will use tap water and what volumes of water could be released.*

Nature of the Water Body

It is important to understand the nature of the water body near the work site to assess the potential risk. For example, flows of rivers and creeks vary considerably, even over a period of days. The larger the flow the greater the ability of the creek to dilute a release of tap water. In general, the same volume of tap water released to the Fraser River would not have the same potential impact as to a small creek such as Mackay creek in North Vancouver. However, it is still possible to impact large rivers as the tap water may not be immediately diluted and can concentrate along the foreshore of the river.

GENERAL PREVENTATIVE MEASURES

One key step is to make all employees that have functions that can result in releases of municipal tap water aware of the environmental risks. This can be completed through a number of means such as memoranda, pamphlets, meetings, etc. Training should occur prior to the onset of the Greater Vancouver Regional District's secondary disinfection program. For the public who access municipal engineering files, specifically for building permits, it is recommended that information regarding the significance of directly releasing tap water in high risk areas be provided with the permit application.

❑ *It is important to inform all staff of the potential environmental risks from the use of tap water.*

General preventative measures that should be communicated to staff include:

- Conserve water as much as possible;
- Turn hoses and taps off immediately following use;
- Never let a hose discharge directly into a storm drain, creek, or ditch; and
- Where possible, let water infiltrate into the ground and not run off.

DECHLORINATION MEASURES

In the event that tap water will be used and discharged to a water body, dechlorination of the water will likely be needed. Water containing chlorine can easily be dechlorinated prior to release through the use of chemical addition. Chemicals recommended for dechlorinating tap water include:

- Sodium thiosulphate, and
- Sodium sulfite

The most commonly used chemical by GVRD staff for neutralizing chlorine is sodium thiosulphate ($Na_2S_2O_3$). This is a granular compound that looks like white laundry detergent. It can be added in either a liquid solution or solid form. Sodium sulphite is used less often as it can reduce the oxygen content of the water it is being added to, which could have a potential impact in the receiving water body if excess chemical is added.

Generally, treatment requires the application of the dechlorinating chemical at the appropriate dosing rate and thorough mixing. The reaction time to neutralize the chlorine is very short and, therefore, the water can be discharged immediately.

The method of applying these chemicals is dependent on the type of water released. In the case of an emergency water release, such as a water main break, the chemicals are usually added in the solid form. For example, the GVRD prepares fibre mesh bags containing crystalline sodium thiosulphate for application in emergency events. In the event of a spill, these bags are placed in the flow path of the spilled water. However, this approach uses an excess amount of the dechlorinating chemical because there is no simple method of measuring the appropriate amount of dechlorinating agent on a continuous basis when in the solid form.

For a planned release of tap water, such as water main flushing, it is much more cost effective to use a liquid solution form of dechlorinating agent and meter the dechlorinating agent into the run-off.

Detailed information about these chemicals, the appropriate dosing rates, and the techniques for dechlorination are given in the *Chlorine Monitoring and Dechlorination Techniques Handbook* (GVRD, 1997) (available at the GVRD Home Page *http://www/gvrd.bc.ca*).

As part of the dechlorination procedure, monitoring for total residual chlorine in the water prior to discharge should be undertaken to ensure the effectiveness of dechlorination. Detailed methodology for measuring residual chlorine levels is also given in the *Chlorine Monitoring and Dechlorination Techniques Handbook* (GVRD, 1997). Inexpensive field kits can be used for this purpose.

SPECIFIC ACTIVITIES

There are numerous activities that use tap water for municipal activities. The purpose of this section is to provide examples of some of these activities and to demonstrate some of the approaches that can be taken to minimize the risk of chlorinated water releases from these activities. Although not all possible activities can be included in this document, the general strategies outlined in the following section can be adapted in many situations.

Road Cleaning

Road cleaning methods vary by municipality. Some municipalities only sweep as part of their road cleaning procedures, while others flush the entire road with water. Water used in road flushing normally is sprayed over the road and ends up in the storm sewer system. As most storm sewer systems connect to local water ways, in some circumstances, there is a risk to local water bodies from road cleaning.

In most cases the chlorine will be neutralized after mixing with the solids and oil and grease that have washed off of the road. Also, the water is well aerated which helps to dissipate the chlorine.

However, in some cases it is possible that roads being cleaned are adjacent to a sensitive water body, such as a creek. Road cleaning methods should include preventative measures to minimize the risk of chlorinated water reaching sensitive water bodies. The dirt and oily residue that washes off the road may, of themselves, create additional water quality concerns.

Treatment Measures

In cases where there is risk for direct discharge of chlorinated water to sensitive water ways, consideration should be given to dechlorinating the water in the truck prior to use. Based on an average tanker volume of 15,000 L, it would take less than 900 g/2 lbs of sodium thiosulfate to neutralize the chlorine in the tanker truck water. This could be added in powdered, or liquid form. The movement of the vehicle will be sufficient to throughly mix the dechlorinating agent.

Refer to the *Chlorine Monitoring and Dechlorinating Techniques Handbook (GVRD, 1997)* for the a complete list of other dechlorinating agents and their appropriate dosage rates.

Reservoir Cleaning

Reservoir cleaning can generate large volumes of water as the reservoir is drained prior to cleaning. A good practice is to lower the reservoir prior to cleaning by drawing the majority of the water into the distribution system. Reservoirs in the lower mainland range in size from 0.45 to 30 million gallons with an average size of approximately 8 million gallons. The volume of water generated during reservoir cleaning if discharged directly to a water body could result in an impact if the water is not treated prior to its release.

The management practices to address discharge of water from reservoir cleaning are given in a document titled *Best Management Practices for Reservoir Cleaning (GVRD 1997)*. This document provides more detailed information than is presented here.

The draining and cleaning operation can generate high volumes of water that can contain chlorine and high levels of total suspended solids. Water drained from the reservoir, and water used to clean the reservoir is generally discharged to a sanitary sewer or to a storm sewer. In some cases, where the sewer system cannot handle the added volume of water, or where there are no sewers in the vicinity, the water is released to drainage ditches or directly into a creek. It is important in these latter cases that the water be completely dechlorinated and total suspended solids reduced to meet the levels required by the prevailing regulatory agencies.

Treatment Measures

If the reservoir cleaning water is to be discharged, sodium thiosulphate or an alternative dechlorinating agent should be used to dechlorinate the water prior to its release. If time is not critical, leaving the water in the reservoir for an extended period will also result in chlorine dissipation.

Dechlorination methods that could be used for reservoir cleaning are detailed in the *Chlorine Monitoring and Dechlorination Techniques Handbook (GVRD 1997).*

The dechlorinating agent can be added at the point where the water leaves the reservoir and flows into the sewer. The dechlorinating agent should not be added inside the reservoir due to concerns for the potential to contaminate drinking water once the reservoir is returned to function.

For treatment of suspended solids please refer to the *Best Management Practices for Reservoir Cleaning (GVRD 1997)*.

Reservoir Overflows

Reservoir overflows can result in chlorinated water entering the sewers or the environment without first being neutralized.

Treatment Measures

Reservoirs are normally equipped with overflow chambers. These chambers should have bags of sulfite installed that could treat an overflow of chlorinated water. A double alarm check system should also be installed that warns of an overflow and automatically shuts the pumps off to avoid allowing water to flow into the sewer system without first being neutralized.

Water Mains

Flushing

Most municipalities undertake water main flushing to remove accumulated sediments in their pipe distribution systems. This is usually accomplished by turning on one or more fire hydrants for a set period of time to increase the water velocity in the pipes.

The amount of water released in a short period of time can be significant in terms of its potential impact. For example, a typical flushing event for a 15 cm (6") diameter pipe could last 1 hour with approximately 18,000 gallons of water released over this period at a flushing rate of 2,048 L/min (450 gpm) or 34 L/s.

To put this in perspective, the flow rates of typical headwater streams and the summer flow rates of such streams as Musqueam Creek in Vancouver and

Smiling Creek in Port Coquitlam, range from 0.1 to 1 L/s. The minimum daily flow rate of MacKay Creek in North Vancouver, or Noons Creek in Port Moody is in the range of 1 to 10 L/s.

Water mains are flushed in sections, normally over the period of a day. As in reservoir cleaning, the cleaning water from the water mains is discharged to the sanitary sewer, the storm sewer, or directly to a local waterway, based on availability of each of these options.

❏ *The potential impact from discharging water main flushing water is considered to be high if the flushing water is not dechlorinated prior to entering local streams. Also, the sediment levels may need to be reduced.*

Dechlorination of water main flushing water should be conducted if detectable levels of residual chlorine is measured. If the water contains total suspended solids of 25 ppm or more than the water must be treated to reduce these levels.

Treatment Measures

Dechlorinating for water main flushing can be accomplished using a solution of sodium thiosulphate metered into the flow of water. A flow meter should be used to monitor the effluent. A portable system could be developed for this purpose. Such a system might consist of 45 gallon barrels containing the dechlorinating agent and a standard metering pump. To allow mixing of the dechlorinating agent and the water some type of physical barrier may need to be constructed. This can easily be accomplished using sand bags, hay bales, etc.

A detailed description of method for dechorinating flushing water is described in the *Chlorine Monitoring and Dechlorinating Techniques Handbook (GVRD, 1997*).

For treatment of total suspended solids, refer to the *Best Management Practices for Pigging and Flushing Water Mains (GVRD, 1997).*

Water Main Breaks

Water main breaks may occur for a number of reasons, including:

- general pipe failure
- improper connections
- valve failure
- accidents
- earthquakes

Due to the magnitude of the damage that an earthquake would cause, the release of chlorinated water to the environment would not be one of the first priorities of emergency response activities. The first priority during an earthquake would likely be to get the water distribution system up and in operation as quickly as possible.

Water main breaks can occur as a pinhole type leak in a small distribution main up to a break in a large diameter transmission main. Therefore water main breaks can release varying volumes of water.

For example, if an 18" water main, with water at a velocity of 1.8 m/s, were to break, it could potentially discharge at a rate of 18,086 L/min or 301 L/s. After only 20 minutes, the main will leak over 350,000 L of water, the equivalent of 23 tanker trucks of water.

❏ *The unpredictable nature of water main breaks make them difficult to treat since the timing and location are never known until the break has been reported, or a noted decrease in water pressure is recorded.*

Response to Water Main Breaks

Detailed response procedures for water main breaks are given in a document titled *Generic Emergency Response for Chlorinated Water* (GVRD 1997) and should be referred to. In brief a response to a water main break should be as follows:

1) *Try to stop the flow of water out of the pipe as much as possible.*

   If the location of the water flow valve is known, it should be used to reduce the flow of the water. It is recommended that the water flow not be completely shut off so as to maintain pressure in the line and reduce the risk of contamination of the water main.

   The flow could also be contained by temporarily sealing the water main at the break point. One method to do this would be to backfill over top of the water main. However, this method has the risk of contaminating the section of water main and, subsequently, disinfection of the main may be required.

   Immediately contact the local municipality about the water main break.

2) *Berm the area to contain the flow as much as possible.*

   A temporary berm can be constructed of anything that will prevent the flow of water from the site. Dirt and sandbags are two examples of readily available construction materials that could be used to berm the water. **Do not direct the water to a storm drain.**

3) *Locate the nearest point of entry to a fish bearing stream, creek or pond and divert the water, where possible, to the longest overland flow before entering the stream.*

   It is imperative that large volumes of chlorinated water be prevented from entering a fish bearing stream. If the water is flowing into a water body, try to divert the flow overland or into a depression where it will infiltrate into the ground or can be held until a dechlorinating agent can be added. Large volumes of flowing water can cause considerable damage to dry land and to structures so use caution if this approach is used.

4) *Immediately use sodium thiosulphate to neutralize the chlorine*.

   An emergency kit with sodium thiosulphate should be on-hand. In the case of this type of emergency, throw a mesh bag containing the dechlorinating agent into the flow path of the released water. If the water has already entered a natural water body, bags should also be placed in this water body.

5) *Measure for residual chlorine*.

   It is imperative to measure for residual chlorine in the discharge water to ensure that the water has been dechlorinated. If measurements indicate that chlorine is detectable in the discharge water or in the receiving water body, additional dechlorinating agents must be added.

6) *If a dechlorinating agent is not available, try to pump the water to a sanitary sewer*.

   The released water may be pumped to a sanitary sewer provided that permission is given by the proper authority. As it would not be practical to obtain permission during the actual emergency event, it must be obtained ahead of time from these agencies.

7) *If there is flow into a water body report the spill to the Provincial Emergency Program at 1-800-663-3456 and to the Department of Fisheries and Oceans at 666-3500.*

Lawn Watering At Parks

In most cases lawn watering at municipal parks and boulevards should not present a problem from the perspective of municipal water releases since the majority of the water infiltrates into the ground. However, in some cases the watering systems may have broken lines or the arrangement of sprinkler heads are misaligned so that significant volumes of water are released to storm sewers or directly to a creek.

The measures proposed for watering at municipal parks are more preventative rather than treatment as follow:

1) *Assess the location of watering systems.*

Determine whether any of the watering systems are located near sensitive water ways. If they are, special attention should be taken with these systems in terms of locating sprinkler heads and the duration of watering. No water should be allowed to directly flow into the local water body.

2) *Assess the quantity of water that is used at the park.*
Does over watering occur such that the ground becomes saturated and run-off is generated? If this is the case, then the system should be reset so that less water is applied to the park grounds.

3) *Assess the type of sprinklers in use.*

The greatest impact of municipal water would likely come from using a high pressure hose which can direct larger volumes of water into a creek or stream. Use soaker hoses, sprinklers and diffusers where possible.

4) *Boulevard Watering*.

Watering lawns adjacent to roads such as a grassed medium presents a more difficult situation to control. Often there is considerable overspray onto the roads, which allows the water to enter the storm sewer system. In most cases the volume of water released to the storm sewer system will not be significant and the storm system itself will help to dissipate the chlorine.

However, there will be circumstances where a sensitive creek is adjacent to the roadway and a potential risk exists. In these cases, the sprinkler heads must be directed away from the road and monitoring of the amount of overspray should be conducted.

Water Parks

Water parks have the potential to release a large volume of water.

At water parks where the facilities primarily consist of swimming pools and water slides, use of tap water is not an issue as the initial chlorine content will have dissipated prior to its discharge and dechlorination would not be required. Though one potential risk comes from overfilling the pool during refilling.

In the case of water parks that have child oriented sprinkler systems and wading pools, the potential for environmental impact from discharge water is much greater if the water is immediately discharged to a storm system. In this case management measures should be taken.

Dechlorination Methods

If the tap water used in the park is discharged to the storm sewer distribution system, the nearest point of discharge from the storm sewer system to the environment should be identified and the residual chlorine levels measured to determine if dechlorination should be undertaken.

The best method for dechlorinating the discharge water from the park is to use a pre-constructed system, which automatically dechlorinates the water. Automated systems are commercially available. For example, one system contains a stack of sodium sulphite pucks, where the bottom pucks in the stack are exposed to the chlorinated water in a chamber. As the puck is used up the next one falls into the flow path of the water (see *Chlorine Monitoring and Dechlorination Techniques Handbook (GVRD 1997)*) for more information.

It should be noted, however, that sodium sulphite is an oxygen scavenger and, as such, may impact the receiving waters. Sodium sulphite should be used only where the impact on receiving water oxygen levels can be demonstrated to be negligible.

Fire Fighting

Training

Fire fighter training often uses more water than actual fire fighting. In a number of cases the water used for fire training purposes is discharged directly to a creek or river by directing the spray of the hose into the water body. As this water contains chlorine there is a potential environmental risk using this method.

At a typical training exercise, it is possible to discharge up to 20,000 gallons over a one hour training session.

Management Measures

1) *Assess the location of fire training*

   Determine where the runoff water from the fire training exercises is directed to. If the water is collecting and entering into a small creek or stream then changes to the fire training procedures must be made. Either the flow should be directed to a system to allow infiltration into the ground or the water will need to be dechlorinated prior to release.

2) *Assess Dechlorination Options*

   A description of a number of dechlorination methods is provided in the *Chlorine Monitoring and Dechlorination Techniques Handbook (GVRD, 1997).* Options for dechlorinating agents and dosage rates are provided in this handbook.

   One example of a dechlorinating method would be to inject a solution of sodium thiosulphate into the fire training hose automatically as the water flows through it. Another method would be to place a bag of solid sodium thiosulphate in the flow path of the water.

3) *Control the release of tap water*

   Controlling the release of tap water can be coupled with the dechlorination techniques mentioned above. The primary focus should be to dechlorinate training water prior to it entering a receiving water body.

4) *Direct the water over a grassy swale or field to allow it to infiltrate into the ground.*

5) *Use non-chlorinated water for fire training.*

If the location of your training facility is such that water can be drawn from the ocean or from a large river such as the Fraser River then use this as an alternate water source. This eliminates the potential for chlorine to be released to the environment.

Emergency Response

The volume of water used at a two-alarm fire, such as a large house fire, can be in the range of 1,800 to 2,500 gallons per minute. This means that after only one hour, fire fighting can produce 108,000 to 150,000 gallons of water. However, a large percentage of this water will leave the site as steam and not discharge to the storm water system.

Tap water used to fight a fire becomes heated and also comes into contact with many solids during a fire. The result normally means that any water running off of the fire site would not contain any detectable concentrations of chlorine by the time the fire was doused.

In addition, the potential exists for many other contaminants, such as oils, greases, metals etc., to be present in the run-off water from the fire.

The need to respond to a release of tap water from fire fighting may, therefore, not be significant in most cases. However, if events such as broken water mains or broken fire hoses occur during a fire event, a large volume of water could be discharged.

Consideration should be given to dechlorination of excess water from a site if a significant volume of water is being released to a sensitive water system. However, dechlorination would only be appropriate if such action did not take resources away from the job of fighting the fire.

Management Measures

The easiest manner to dechlorinate water would be to throw bags of solid sodium thiosulphate into the flow path of the water. For example, 20 pound fibre mesh bags could be made up in advance and kept on-hand for such emergencies. An example of an emergency response kit is given at the end of this document.

ENVIRONMENTAL MANAGEMENT PLAN

As part of the overall environmental management plan for the use of tap water, the GVRD has prepared a Water Spill Response Planning System related to water releases in the greater Vancouver region. The system includes maps that illustrate the location of:

- water distribution pipes;
- storm sewer distribution pipes;
- manholes and catch basins;
- storm sewer outfalls;
- fisheries resources;
- special features such as hatcheries;
- hydrology, such as streams; and
- flow direction.

The maps can be viewed through a computer and can be accessed at the local municipal offices in the engineering and planning departments, or on a laptop computer. The maps provide such information as the location of the nearest fish bearing water body, the location of the point of discharge for a storm sewer, and the direction of flow for water in storm sewers and/or rivers.

SUMMARY

Release of chlorinated water from municipal activities is a concern due to the volume of water released during these activities, and the potential for the water to be released directly into a receiving environment. The primary preventative measure outlined above is to avoid direct discharge of municipal water into a water body. Due to the elevated levels of chlorine in the water, direct discharge would be harmful to aquatic life. If this cannot be achieve then systems to dechlorinate the water should be employed.

By following the measures outlined above, the potential for environmental impact from municipal activities using chlorinated water can be minimized.

Other Important Reference Documents Available at the GVRD:

① Chlorine Monitoring and Dechlorination Techniques Handbook (GVRD, 1997)

② Generic Emergency Response Plan for Chlorinated Water (GVRD, 1997)

③ Best Management Practices - Reservoir Cleaning (GVRD, 1997)

④ Best Management Practices - Pigging and Flushing Water Mains (GVRD, 1997)

Reference documents are available from the GVRD Home Page on the World Wide Web at: *http://www//gvrd.bc.ca*

KEY CONTACTS AND PHONE NUMBER

Contacts for Water Main Leaks/Breaks

Municipality	Location	Working Hours	After Hours
Burnaby	Dispatch Office	294-7200	294-7200
Coquitlam	Engineering Customer Service	664-1500	942-3657
Delta	Engineering	946-3260 / 946-5334	946-4411 (Police)
City of Langley	General Switchboard	530-3131	534-3496
Township of Langley	Operations Centre	534-7300	534-3496
District of Maple Ridge	Operations Centre	463-9581	463-9581
New Westminster	Operations Centre	526-4691	526-4691
City of North Vancouver	Works Yard/Fire Hall (after hours)	983-7155	988-2212
District of North Vancouver	Operations	990-3830	990-3830
District of Pitt Meadows	Operations	465-2434	643-8348
Port Coquitlam	Engineering	944-5420	942-3657
Port Moody	Operations	469-4538	461-3456
Richmond	Dispatch	270-8721	270-8721
Surrey	Works Yard	590-7226	591-4431
UBC	Plant Operations (Trouble Call Line)	822-2173	822-2173
UEL	Works Yard/Arpel Security after hours	660-1808	437-1078
Vancouver	Waterworks Department	323-7800	323-7800
West Vancouver	Works Yard	925-7100	925-7100

Greater Vancouver Regional District

- Lake City Operations Centre **(604) 444-8401**

Environmental Reporting

- Provincial Emergency Program **1-800-663-3456** (Spill Reporting)
- Department of Fisheries and Oceans **(604) 666-3500**
- Environment Canada **(604) 666-6100** (24-hour spill reporting number)

EMERGENCY EQUIPMENT AND SUPPLIES

The following is a list of equipment and supplies that should be kept on-hand for responding to a spill of chlorinated water[1].

Chemical Supplies

- two 20 lb. bags of anhydrous sodium thiosulphate
- three or four pre-made plastic weave bags with anhydrous sodium thiosulphate

General Equipment

- dechlorinating bag tether ropes (at least two, 20 m long each)
- record book

Testing Equipment

- field chlorine testing kit (eg: HACH kit)
- Record of Activities Sheet (RAS)

Personal Safety Equipment

- clear plastic goggles (the kind that suction around your eyes)
- rubber gloves
- particle mask
- Material Safety Data Sheet (MSDS) for sodium thiosulphate and for the chlorine testing reagent

Telephone Numbers

- be sure to have the list of municipal and environmental agency emergency telephone numbers

[1] A description of emergency response procedures is provided in the Chlorine Monitoring and Dechlorination Techniques Handbook (GVRD, 1997).