































Visit the Safe Drinking Water Foundation Website [www.safewater.org](http://www.safewater.org) to learn more about issues affecting safe drinking water.

### Colour:

**Where does the colour of the water come from?**

When water has a visible tint to it, it is usually due to the presence of decaying organic material or inorganic contaminants such as iron, copper, or manganese. Limits for colour in drinking water are usually set based on aesthetic considerations. The Canadian guidelines are set at 15 TCU (True Colour Units), as most people can easily detect colour exceeding this level. Generally, colour is classified into two types: true and apparent colour. The most common cause of true colour is decaying organic material such as dead leaves and grass. This type of colour is usually found in surface water. Apparent colour is caused by inorganic materials, usually iron, copper or manganese. The true colour of water can be distinguished from the apparent colour by filtering the sample to remove the larger organic particles. The following table lists some frequent colours that may be detected in drinking water and their most common causes.

<b>Colour</b>	<b>Cause</b>	<b>Health Hazards/Other Problems</b>
Red or Brown	Generally indicative of iron or manganese in water	Stains sinks and discolours laundry
Yellow	Suspended organic particles	No adverse health risks (unless chlorinated; see below)
Blue or Green	Generally due to copper in water supply or corrosion of copper pipes leading into water supply	Can cause staining of fixtures and laundry; high copper content (30ppm) can cause vomiting, diarrhoea, and general gastrointestinal symptoms

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Cloudy, White, or Foamy	Usually due to turbidity (finely divided particles in water, either organic or inorganic)	No adverse health risks but can cause abrasions to pipes and staining of fixtures
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**What are the health risks associated with drinking coloured water?**

Generally speaking, the colour in water does not pose any health risks. However, there are some exceptions. If the colour is due to a metal contaminant, such as copper, mild gastrointestinal symptoms may result. Therefore, Canadian guidelines stipulate certain recommended limits to many inorganic materials. Also, when chlorinated, any organic material that is present in the water can combine with the chlorine to form compounds called trihalomethanes (THMs). Chloroform is a common THM and is considered potentially carcinogenic (cancer causing). Therefore THMs in drinking water supplies that are routinely chlorinated are closely monitored and also have recommended limits.

**What do I do if my water exceeds colour limits?**

Colour in water can easily be removed using activated carbon filters (charcoal). However, these filters need to be replaced periodically to maintain colour absorption activity. In larger plants, a common treatment method called coagulation and sedimentation is used. This method utilizes alum and other chemicals to remove the materials that cause colouration of drinking water, before being pumped out to people’s homes.

## Copper Analysis (Elementary)      Written June 5, 2009

**Purpose:** To determine the Copper concentration of a sample. Testing will be done on a Local Community Treated Water sample and a Canadian Guideline Limit Sample for quality control purposes:

Determination will be done by using a test strip method. You will see if the Local Community Treated Water meets the Canadian Drinking Water Guidelines. Copper is naturally present in the environment, but the levels of contamination can be increased around agricultural land (manure spreading), near smelting facilities, and phosphate fertilizer plants, there is also significant amounts of copper released from wastewater treatment plants. The copper piping in most buildings that we consume water from also can contribute to our intake, depending on the corrosiveness of the water. Copper is essential to good human health but we don't have to concern ourselves with not getting enough copper, it is present in the food we eat, the air we breathe (more so around large manufacturing plants and industries), and the water we drink. We can, however, consume too much copper and some of the possible negative health effects of excess copper are dizziness, vomiting, diarrhea, upset stomachs, and headaches. A 1 mg/L Canadian Guideline Limit sample will be included for quality control purposes; this is also the limit for copper according to the Canadian Drinking Water Guidelines.

**Materials:**

- 1 - 1 mg/L Canadian Guideline Limit sample (Copper Standard).
- 2 - Test strip packets, with colour charts printed on them.
- 2 - 10 mL disposable beakers.

**Method:**

1. Label the two beakers with their appropriate water sample names.
2. Put 10 mL of sample in their respective beakers.
3. Dip one test strip in sample or (CGLS) beaker for 30 seconds with constant back and forth motion.
4. Remove and match colour after 2 minutes to determine the Copper concentration in mg/L or parts per million (ppm).

**Results:** Compare results to the Canadian Drinking Water Guidelines. The Canadian Guideline should give a result very close to the 1 mg/L guideline; a darker colour means that the water **Does Not** meet Canadian Drinking Water Guidelines.

**Safe Handling of Materials Caution must be taken at all times when handling any chemicals. Although this test is safe to use in any area, please be cautious with the materials supplied.**

## **Copper Fact Sheet**

### **What is Copper and why do we test for it?**

Copper is a metal that is naturally present in the environment, but the levels of contamination can be increased around agricultural land (manure spreading), near smelting facilities, and phosphate fertilizer plants. There are also significant amounts of copper released from waste water treatment plants, which could lead to problems downstream for a community that uses this water as their source water. Farmers and others that rely on small water reservoirs for their water supplies may at times try to control algal blooms with copper sulphate (bluestone), which can increase the copper levels in their water supplies but as copper is taken up by the algae its levels should decline rapidly.

However, the main source of copper comes from household plumbing especially when the water is corrosive. As the copper levels in the water treatment plant is generally acceptable compliance with the Copper Guideline is generally achieved by controlling the corrosiveness of the water in the treatment plant. The corrosiveness of water towards copper is generally highest when the water is acidic (pH less than 7, see pH Test), the Alkalinity is low (see Alkalinity Test), and the Hardness is low (see Hardness Test).

**What are the Canadian Drinking Water Guidelines for Copper?**

The guidelines state that the level should not exceed 1 mg/L copper. The U.S. Environmental Protection Regulation for copper is 1.3 mg/L. The World Health



Organization has established a 2.0 mg/L guidance level.

**What are some of the health risks associated with Copper?**

Copper is an essential nutrient, required by the body in very small amounts. However, health affects may occur when people are exposed to it above the guideline level. The National Academy of Sciences' Food and Nutrition Board recommends that children need at least 0.34 mg Copper/day and adults need 0.9 mg copper/day. It also recommends that consumption should not exceed 9 mg copper/day.









pH. It is always best to check with water treatment experts when deciding on the products and the volumes to use when adjusting pH.

## Sulphate Analysis (Elementary)

Revised July 4<sup>th</sup>, 2007

**Purpose:** To determine if the water sample meets Canadian Drinking Water Guideline for Sulphate making a visual comparison of precipitate present. Testing will be done on Local community treated water; the teacher will do this as a demonstration. There is a 500 mg/L Canadian Drinking Water Guideline for sulphate in drinking water; you will test and compare your result to see if it meets these guidelines. **PLEASE NOTE:** If you are conducting this test in the USA, then the Sulphate standard that has been supplied with the kit is 250 mg/L.

### Materials:

- 3 - Plastic cups
- 2 - 2 mL plastic pipettes
- 1 - 2 mL Canadian Guideline for Sulphate sample (CGLS) (500 mg/L CAD; 250 mg/L USA)
- 3 - 5 mL vial containing 2 mL of Sulphate Reagent 1
- 3 - 5 mL vial containing 3 mL of Sulphate Reagent 2
- 50 mL graduated cylinder (not supplied with kit - teacher must supply)

### Method:

1. Label the 3 plastic cups with appropriate number, and name:
  - #1 - Control
  - #2 - Canadian Guideline (CGLS)
  - #3 - Local Community Treated Water
2. Label the 2 pipettes: DI (for Deionized Water), LTW (for Local Community Treated Water).
3. Using a graduated cylinder, measure out 25mL of Deionized Water to each of the 3 cups.
4. To the #1 Control cup, add 2ml of the Deionized Water using the pipette labeled DI.
5. To the #1 Control cup, add contents of one of the Sulphate Reagent 1 tubes.
6. To the #1 Control cup while swirling, add contents of one of the Sulphate Reagent 2 tubes. Continue swirling for 1 minute and then set the cup aside.
7. To the #2 cup (Canadian Guideline (CGLS)), add contents of tube labeled Canadian Guideline (CGLS).

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8. To the #2 cup, add contents of one of the Sulphate Reagent 1 tubes.
9. To the #2 cup while swirling, add contents of one of the Sulphate Reagent 2 tubes. Continue swirling for 1 minute and then set the cup aside.
10. To the #3 cup, using the pipette labeled LTW, add 2 mL of the Local Community Treated Water.
11. To the #3 cup, add contents of the Sulphate Reagent 1 tube.
12. To the #3 cup while swirling, add contents of the Sulphate Reagent 2 tube. Continue swirling for 1 minute and then set the cup aside.
13. Determine the cloudiness of the cups **Relative to the** Canadian Guideline for Sulphate sample (CGLS) (more or less cloudy) and record the results.

**Results:**

The Canadian Guideline sample should be cloudy. The local community treated water sample may or may not be cloudy. If the water sample is less cloudy than the Canadian Guideline, then it passes the Canadian Drinking Water Guideline for Sulphate, which is 500 mg/L. The Control should not have any cloudiness present.

**PLEASE NOTE:** FOR USA Kits: The guideline sample should be cloudy. The local community treated water may or may not be cloudy. If the water sample is less cloudy than the standard cup, then it passes the U.S. Environmental Protection Agency's guideline for Sulphate, which is 250 mg/L. The Control should not have any cloudiness present.

**Safe Handling of Materials**

**Caution must be taken at all times when handling any chemicals. Although this test is safe to use in any area, please be cautious with the materials supplied.**

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## Sulphate:

### **What is sulphate and why do we test for it?**

Sulphur is a non-metallic element that is widely used for commercial and industrial purposes. Sulphur combines with oxygen to form the sulphate ion,  $SO_4$ . Sulphate products are used in the manufacture of many chemicals, dyes, soaps, glass, paper, fungicides, insecticides, and several other things. They are also used in the mining, pulp, sewage treatment and leather processing industries. Aluminum sulphate (alum) is used in water treatment as a sedimentation agent, and copper sulphate has been used to control blue-green algae in raw and public water supplies.

Drinking water with excess sulphate concentrations often has a bitter taste and a strong 'rotten-egg' odour. Sulphate can also interfere with disinfection efficiency by scavenging residual chlorine in distribution systems. Sulphate salts are capable of increasing corrosion on metal pipes in the delivery system and sulphate-reducing bacteria may produce hydrogen sulphate which can give the water an unpleasant odour and taste and may increase corrosion of metal and concrete pipes.

### **What are the current Canadian limits for sulphate?**

The current limits for sulphate in drinking water are based on aesthetic objectives and are set at <500mg/L, which is the taste threshold level.

### **What are the health risks associated with high or low sulphate levels?**

There are no symptoms associated with sulphate deficiency. However, most people get the majority of their dietary sulphates through food and not from the water. High sulphate levels (1000 mg/L) have been shown to have a laxative effect on humans and can cause mild gastrointestinal irritation. Therefore, excessively high sulphate levels are usually investigated by water treatment authorities.

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### **What do I do if my water exceeds the recommended sulphate limit?**

Unfortunately, sulphate is not easily removed from drinking water as it is often in a form that is quite soluble in water. The most effective removal methods include distillation, reverse osmosis or electrodialysis. For home treatment reverse osmosis and distillation are most common.

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## Total Chlorine Analysis (Elementary) Revised May 14, 2010

- **Purpose:** To determine the total chlorine concentration in your local drinking water. Find two different locations (drinking water fountain, tap water from the gym etc.) and sample the water into cups provided, label the cups from where the water came before you sample.

The determination will be done by using a test strip method. You will compare the different results, and you will also see if the water meets the Canadian Drinking Water Guidelines.

The current Canadian Guideline is that water should have a 0.5 mg/L total chlorine content. Unlike most of the other guidelines this is a minimum concentration allowed.

### Materials:

- 2 - Test strip packets with colour chart printed on packet for determining Total Chlorine concentration.
- 2 - Drinking glasses.

### Method:

1. Label the two glasses with their respective names.
2. Put about 50 mL of sample in respective glasses (volume is really not critical).
3. Dip one test strip in glass for 5 seconds with constant back and forth motion, so that water passes through the small aperture in the test strip.
4. Remove and shake the test strip once, briskly, to remove any excess water on the strip. Allow the test strip to dry for 30 seconds by lying across glass.
5. Match with the best colour to determine the Total Chlorine concentration in mg/L or parts per million (ppm). Complete the colour matching within 15 seconds. Do one sample at a time.
6. Write up your results.

**Results:** Compare results to the Canadian Drinking Water Guidelines of 0.1 mg/L; a lighter colour of green means that the water **Does Not** meet Canadian Drinking Water Guidelines, a darker colour means that the water treatment plant may be

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using excessive amounts of chlorine. Please refer to the facts sheets below for more information on chlorine.

### **Safe Handling of Materials:**

**Caution must be taken at all times when handling any chemicals. Although this test is safe to use in any area, please be cautious with the materials supplied.**

Visit the Safe Drinking Water Foundation Website [www.safewater.org](http://www.safewater.org) to learn more about issues affecting safe drinking water.

## **Total Chlorine:**

### **What is Total Chlorine and why do we test for it?**

Chlorine is a chemical that is used to disinfect water prior to it being discharged into the distribution system. It is used to ensure water quality is maintained from the water source to the point of consumption. When chlorine is fed into the water, it reacts with any iron, manganese, or hydrogen sulphide that may be present. If any chlorine remains (residual), it will then react with organic materials, including bacteria. In order to ensure that water is sufficiently treated through the whole distribution system, an excess of chlorine is usually added. This amount is usually adjusted to make sure there is enough chlorine available to completely react with all organics present.

The chlorine will decrease in concentration with distance from the source, until it reaches the point where the chlorine level can become ineffective as a disinfectant. Bacteria growth will occur in distribution systems when very low levels of chlorine are encountered. Therefore, it is important to make sure there is enough chlorine to efficiently disinfect even at the far ends of the distribution system. Chlorination can kill many pathogenic (disease causing) microorganisms such as *E.coli*, but others, like *Cryptosporidium* and *Giardia*, are very resistant to chlorine and require other measures to properly remove them.

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There are some important chlorination trends found in drinking water treatment:

- As chlorination increases, the time required to disinfect decreases.
- Chlorination is more effective as the temperature increases.
- Chlorination is less effective as pH increases (becomes more alkaline).
- Chlorination is less effective in turbid water.



Residual chlorine may have a taste and/or odour that some people may find disagreeable. However, most would prefer that to drinking water that contains potentially harmful inorganic and organic materials.

### What are the current Canadian recommendations for total chlorine?

There are two ways in which residual chlorine is measured. Free Chlorine is the chlorine that remains in the water that has not reacted with anything (organic or inorganic). Total Chlorine is the chlorine that remains in the water that is both free and reacted.



The Federal-Provincial-Territorial Committee on Drinking Water recommends a minimum Free Chlorine residual of 0.1mg/L or a minimum Total Chlorine level of 0.5mg/L.

### What are the health risks associated with low total chlorine?

Studies have shown that when total chlorine levels drop below recommendations, several water quality problems can occur. With regard to public health, bacteria and selected viruses, called bacteriophages, are able to multiply in water that is not properly disinfected and, depending on the species, could potentially cause waterborne illnesses.

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It is important to note that, although chlorination has been the most common method of disinfection for over 100 years, there have been recent studies that have shown that chlorine in water can react with otherwise innocent organic material in drinking water and form chemicals called Trihalomethanes (THMs), such as Chloroform. THMs have been shown to be potentially carcinogenic (cancer causing) and are, therefore, carefully monitored in water systems that are routinely chlorinated. While recommendations only state minimum total chlorine levels, it is important that a careful balance is maintained in drinking water. There needs to be enough chlorine to make sure everything is properly disinfected. However, an extreme excess of chlorine is not necessary and may lead to high levels of THMs and the adverse health risks described previously.

### **What do I do if my water does not meet total chlorine recommendations?**

In municipal water systems, the drinking water is chlorinated prior to being distributed and chlorine totals should be measured at the far end of the distribution line. This ensures that the house located furthest from the plant still receives water that is adequately disinfected. If your water does not have appropriate chlorine residual levels, contact your local treatment facility and have them conduct further tests to make sure enough disinfectant is added to the water at the plant. For homes that get their water from wells, either commercial disinfectants or diluted household bleach may be used to adequately treat drinking water. Usually, gaseous chlorine is added to the water at large treatment facilities. However, this form of chlorine is too dangerous to be used for home use and other disinfectants such as those mentioned above are recommended. Contact a local water treatment authority to determine the recommended levels for your well system.

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## Total Hardness Analysis (Elementary School) Revised October 6, 2006

**Purpose:** To determine the Total Hardness concentration in drinking water on a Local Community treated water and a Saskatchewan Guideline Limit Sample (SGLS) for quality control purposes.

Determination will be done by using a test strip method. You will compare the result with the enclosed quality control sample.

Total hardness is a measurement of calcium and magnesium, and is expressed as calcium carbonate; our body needs both Ca and Mg to remain healthy. In some countries minimum levels of calcium have been advocated (levels should be greater than 20 mg/L for calcium). The major concern with elevated levels of hardness is scale depositing on piping and drains making them less efficient. If water is too hard it will also decrease the washing ability of many soaps and detergents (the soap may not clean properly), as well as affect the taste of the water.

### Materials:

- 1 – An 800 mg/L Total Hardness (SGLS)
- 2 - Test strip packets (with colour charts printed on them)
- 2 - 10 mL disposable beakers.

### Method:

1. Label the two beakers with their respective names.
2. Put 10 mL of sample in the beakers.
3. Dip one test strip in sample beaker for 3 seconds.
4. Remove and immediately match to the closest colour on the colour chart that is located on the test strip packet. Colour is **only stable** for **1 minute**.
5. Read and record the results as mg/L (parts per million), match with the best colour to determine the Total Hardness concentration.
6. Repeat for the Guideline Limit Sample.

## Results:

The Saskatchewan Guideline Limit Sample (SGLS) for Total Hardness should give a result very close to the 800 mg/L guideline; this is a very high level of hardness and should only be encountered in untreated well water sources.

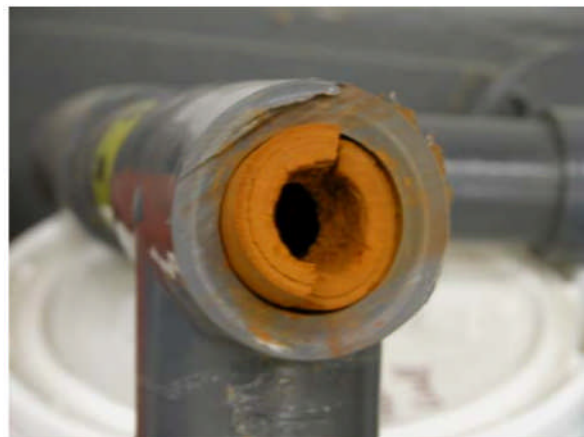
### Safe Handling of Materials

**Caution must be taken at all times when handling any chemicals. Although this test is safe to use in any area, please be cautious with the materials supplied.**

## Total hardness:

### What is total hardness and why do we test our water for it?

The ~~Guides~~ *Guides* for hardness are based on aesthetic, rather than health concerns. Hard water causes scale to form in water pipes, plumbing fixtures and kitchen appliances (see photo). Scale build-up in hot water tanks and boilers increases heating costs and can lead to premature failure of heating equipment. Scale deposited in clothing during washing will cause increased wear and tear on fabrics. Soap reacts with hard water to form a curd and can also cause skin flaking and irritation. In addition, when washing or doing laundry with hard water, more soap or detergent is needed.



### Where does hardness in water come from?

Hardness is primarily caused by the dissolved mineral compounds calcium and magnesium although smaller contributions to hardness will also come from some other ions including iron and manganese. The amount of hardness is expressed in milligrams per litre (mg/L) or grains per gallon (gpg) as calcium carbonate.

Hardness is calculated from the equation  $Hardness = 2.497 * Ca + 4.118 * Mg$ . Therefore, fluctuations in the magnesium pool affect hardness stronger than do calcium fluctuations.

The main components of hardness, calcium and magnesium, are actually of benefit to people. There are no Canadian guidelines for calcium in water and when present in drinking water, calcium may be considered to be of nutritional benefit (if levels around 50 mg/L were consumed, drinking water would provide around 5 to 10% of the daily calcium requirements). The European Community has set

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a guideline level of 100 mg/L with no maximum acceptable upper concentration. The European Union



has also stated that water intended for human consumption should contain a minimum of 20 mg Ca/L.

Magnesium is an essential nutrient for humans, with adults requiring around 350 mg per day. Moderate levels of magnesium may provide a nutritional benefit to individuals consuming a magnesium deficient diet. There are no Canadian recommendations in regard to magnesium, but the European Community suggests a guideline of 30 mg/L, with a maximum acceptable level of 50 mg/L, which may be related to magnesium's strong effect on hardness and has no health significance.

### **What do guidelines say about hardness?**

The *Guidelines for Canadian Drinking Water Quality* notes the following:

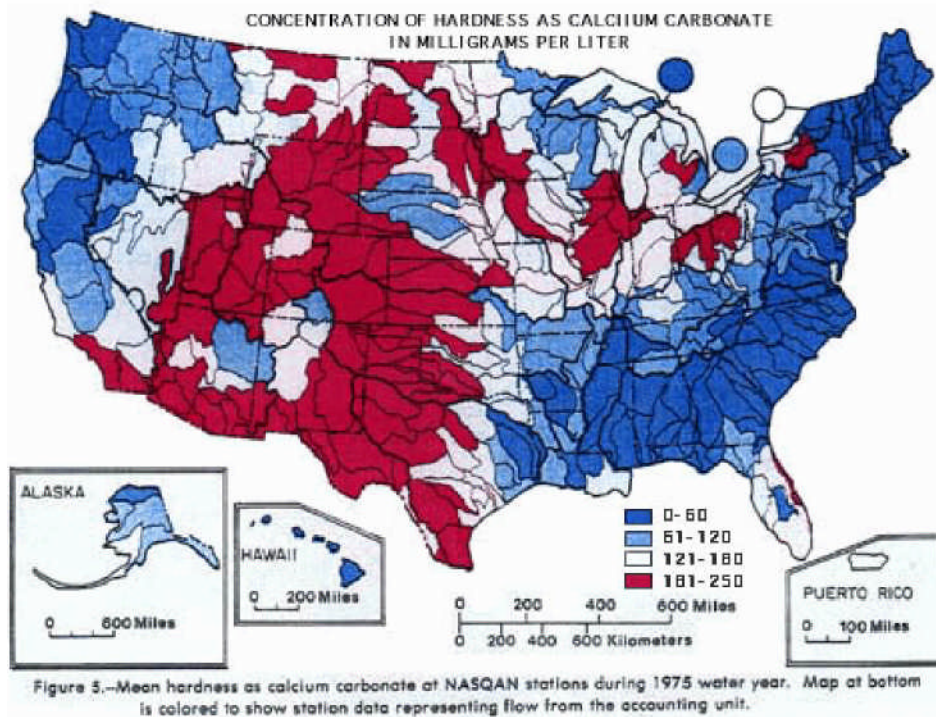
- 1) public acceptance of hardness varies considerably. Generally, hardness levels between 80 and 100 mg/L as CaCO<sub>3</sub> are considered acceptable;
- 2) levels greater than 200 mg/L are considered poor but can be tolerated;
- 3) levels in excess of 500 mg/L are normally considered unacceptable;
- 4) where water is softened by sodium-ion exchange, it is recommended that a separate unsoftened supply be retained for culinary and drinking purposes.

The Saskatchewan Government has set an upper acceptable limit for hardness to 800 mg/L. Such high levels will, however, impart a taste to the water and will cause problems with clothes washing, minerals will be deposited on dishes, tubs and showers and water heaters will become less efficient.

### **What happens if the hardness is too low or too high?**

If the hardness is too low the water can be quite corrosive leaching copper and lead out of plumbing pipes. With very low hardness there would also be low levels of beneficial ions in the water, especially calcium and magnesium. If hardness is too high it can have an unpleasant taste, can dry out skin and cause scaling on fixtures and throughout the water distribution system. This scaling is undesirable because it begins to decrease the efficiency of plumbing systems, which results in greater power consumption and increased costs.

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Map of total hardness in water across the United States. It is expected that the shown trends continue into Canada

Source: <http://water.usgs.gov/owg/map1.ipeq>

### **What do I do if the level of hardness in my water is too low or too high?**

Public water utilities with high hardness levels may not be able to lower these levels as it is difficult to do this before an increased use of membrane technologies become common in the future. These membranes, such as nanofiltration membranes and reverse osmosis membranes can effectively remove both calcium and magnesium ions from the water (the main causes of hardness). However, when using Reverse Osmosis (which removes virtually all calcium and magnesium ions) it should be borne in mind that the European Union has stated that water intended for human consumption should contain a minimum of 20 mg Ca/L. RO treated water frequently fail to meet this guideline unless calcium is added back to the water. In homes the use of softeners is more common where calcium and magnesium ions are replaced by sodium or potassium, although many homes are now installing under the sink reverse osmosis membranes to provide drinking water.

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**Time Frame:** 60 minutes minimum

### **Objective**

Giving students the opportunity to become aware of how their actions and participation can affect their community in a positive manner. They can use the skills and ideas learned in the previous lessons to formulate an action plan with the hopes that upon completion they have become more aware of the importance for safe drinking water, and its implications with the environment. It is recommended that students complete this lesson after they have completed all test analyses in **Operation Water Drop** as well as participated in **Operation Water Flow** (Social Studies, Science), **Operation Water Health** (Health, Language Arts, Science, Social Studies), **Operation Community Water Footprint** (Math, Science), **Operation Water Pollution (Science, Social Studies)** and **Operation Water Spirit** (Native Studies, Language Arts, Phys Ed.) These lessons support and encourage the “bigger picture”, OWF, OWH, OCWF and OWS are available free of charge online at [www.safewater.org](http://www.safewater.org) Operation Water Pollution kits can be purchased for a cost-recovery fee of \$140 (and are often available through sponsorships).

### **Topic**

Develop a strategic plan of action to protect and ensure safe drinking water for your community, and for ALL Canadians! The Action Plan can include any of the following:

- What can I do, individually, to help conserve our community’s drinking water supply?
- What can be done to protect and conserve drinking water sources?
- What activities impact our community’s drinking water supply, both negatively and positively?
- What can our Member of Parliament or Legislative Assembly do to improve this situation?

If our community’s drinking water passed every single test it is unlikely that many other communities did so – how can we make safe drinking water a right of ALL Canadians?

### **Suggested Outline**

- Divide students into groups, the breakdown of groups may be:
  - Urban, Rural, and First Nations water supplies
  - Local Community, Provincial and National Responsibilities to drinking water
  - Canadian drinking water guidelines, USA and European drinking water regulations
  - Who affects our water – Whose water do we affect?

### **Suggested Activities**

- **Posters:** Have students design a poster to demonstrate the actions communities or individuals can take to protect their water supplies. Compare the posters from each group, as each strategy should be different. If possible, display the posters in a place where members of the community will have an opportunity to view them.
- **Peer teaching:** Have each group teach the rest of the class about their water supply and how individuals and the community can work together to protect it. Operation Water Spirit has lessons in grade five and grade seven which encourage students to interact with different age levels and the community at large.

- **Write a letter:** Express your concern or satisfaction to a local or provincial newspaper, politician or a water provider.
- **Complete a Community Action Plan** which if you send digital or electronic files to SDWF they will post them on-line.
- For additional ideas, please refer to the Safe Drinking Water Foundation website: [www.safewater.org](http://www.safewater.org)

### **Community Education**

Have each group partner with older students who have participated in the high School Operation Water Drop program and/or the community about their water supply and how the community can work together to protect it.

Have groups each research a different, but water related topic. Possible topics include:

- Waterborne diseases: Which ones are reportable? How do doctors recognize them? How are the stats recorded? Etc.
- Legalities surrounding safe drinking water in Canada compared to USA or Europe?
- Boil Water Advisories: What is a Boil Water Advisory (BWA)? Who is responsible for calling one?
- Testing: How many "guidelines" are tested for? How is the water tested? Is the analysis of coliforms and nitrates sufficient to determine if water is safe to drink? What do the results of the different tests mean?

Students are invited to submit digital images (please do not send posters and print material) of their Action Plans to [info@safewater.org](mailto:info@safewater.org) they will be posted online along with your analytical results.

## Student Evaluation

Name: \_\_\_\_\_

### Knowledge/Understanding

Knowledge of issue and depth of analysis. / 10  
Sufficient information presented. / 10

### Thinking/Inquiry

Material is well-integrated. / 5  
Original and creative. / 5  
Effective selection of information. / 5  
Ideas are relevant to topic. / 5

### Communication

A/V resources supplement & enhance information. / 5  
Delivered in a well-modulated & distinct voice. / 10  
Inconspicuous use of notes and outlines. / 5  
(Maintained eye contact with audience.)

### Learning Skills - Organization

Well prepared to present. / 5  
Information follows a logical sequence. / 5  
Follows agenda and manages time well. / 5

### Learning Skills - Teamwork

Group members are organized,  
prepared & cohesive. / 5  
Clear introduction of topic(s) and activity. / 5  
Active role taken by each group member. / 5  
Time is well-managed. / 5  
Able to handle questions, manage audience  
& initiate meaningful activity/discussion. / 5

Total score out of possible 100

Comments: