

GREATER VICTORIA DRINKING WATER: *From Source to Tap*



KEY CONCEPTS

- THE GREATER VICTORIA DRINKING WATER SUPPLY SYSTEM IS CONNECTED TO A SEVERAL DIFFERENT WATER DISTRIBUTION SYSTEMS.
- WATER IS IMPORTANT TO ALL PEOPLE.
- WATER RESOURCES IN GREATER VICTORIA ARE MONITORED FOR THEIR QUALITY AND QUANTITY.

METHOD

Students will view the video *From Source to Tap* on the movement of water from the watershed to the community and complete an information review using worksheets and a roundtable game.

ACTIVITY INFORMATION BOX:

TIME REQUIRED: 50-60 minutes

GRADE LEVEL: Grades 8-12

KEY WORDS: *Water system, disinfection, water supply*

MATERIALS:

- *From Source to Tap* video
- TV/DVD player
- Video Work Sheet
- one chair for each student, arranged in a circle broken in 3 places
- whistle/bell
- perspective signs

SETTING: indoors

SKILLS: listening, observing, gathering information, recall

SUBJECTS: Science 8-10
Chemistry 11-12
Science and Technology 11

LEARNING OUTCOMES:

IT IS EXPECTED THAT THE STUDENT WILL:

- Be able to explain the path of their drinking water from the reservoir to their taps;
- Understand the importance of monitoring the water supply;
- Describe of the water disinfection system process.



BACKGROUND

The *Water in Our Community* video *Water: From Source to Tap* looks at where our water comes from and how it gets from the reservoir to our taps. Viewers are taken to the Greater Victoria Water Supply Area in the Sooke Hills. They are shown Sooke Reservoir, the Japan Gulch Disinfection Facility and how water moves from the reservoir to the taps in our communities. This lesson's purpose is to help students to recall critical information from the video and to help students to get a bigger picture of water usage from different perspectives using a review process.

PROCEDURE

1. Ask students:
 - Where does drinking water come from in the Greater Victoria area?
 - What does the CRD Water Services do to ensure safety of the water we drink?
2. Handout the Student Worksheets to each student and allow a brief time for reviewing the map and worksheet questions before showing the video.
3. Show the video. Have students fill out the student worksheet and colour in the route water takes from the Sooke Reservoir watersheds to their community.
4. Set up the video review by asking students to pick up their chairs and arrange them in a circle. Make three breaks in the circle by separating the chairs. Assign a perspective or viewpoint to each of the sections formed: e.g., 1) Greater Victoria resident 2) Water Quality Professional 3) CRD Water Manager. You may want to make labels as reminders of the perspective of each section.
5. Allow some preparation time for the small groups to think of the points they could make from their starting position using the information they learned in the video. Remind students that they may only contribute comments that relate to their assigned perspective, and to use good discussion techniques.
6. Make up some questions that can be answered from a variety of perspectives. Such as:
 - How is your water supply protected?
 - How do we ensure quality of the water we drink?
 - Why is a three-step disinfection process used in Greater Victoria?
7. Starting at one section, ask students to provide an answer based on what they learned in the video - according to their section perspective. After all sections have answered, then move onto another question. To keep the activity exercise active: every few minutes, give a signal (e.g. by standing up; blowing a whistle; ringing a bell) and everyone moves around one seat to the left. After about 15 minutes, everyone is back in their original seat having spent around 3 or 4 minutes experiencing each of the three positions.

EVALUATION

Have students:

- Complete the worksheets on the video segment;
- Describe how water moves from its source to the tap from a number of perspectives.



EXTENSIONS

1. Students research water supply and disinfection methods in the Third World and remote communities in Canada.
2. Have students complete the word search activity.

COMMUNITY CONNECTIONS

1. Invite a scientist to the classroom who can speak to different ways of water purification and the pros and cons of each method.
2. Invite a speaker who has worked in a Third World environment to talk about how people get and use water in that place.

ADDITIONAL RESOURCES

Go to the CRD Water Services website for additional information. <http://www.crd.bc.ca/water>

CRD. *Refreshing Information About Drinking Water Quality in Greater Victoria* available at <http://www.crd.bc.ca/water>

GLOSSARY:

SOLVENT: A solvent is a substance that dissolves, or breaks apart, another substance (known as a solute). Because of its high polarity, water is called the universal solvent.

ULTRA VIOLET LIGHT TREATMENT: the use of a disinfectant that kills micro-organisms only. It does not remove any other contaminants.

GIARDIA OR GIARDIA LAMBLIA: Giardiasis is an intestinal illness caused by a microscopic parasite called Giardia lamblia. It is sometimes referred to as Beaver Fever. It is passed in the feces of an infected person or animal and may contaminate water.

CHLORAMINE (NH₂Cl): Chloramines comprise of three chemicals that are found when chlorine and ammonia are combined in water; Monochloramine (NH₂Cl), Dichloramine (NHCl₂), and trichloramine (nitrogen trichloride - NCl₃). From a water utility perspective, the desired form is monochloramine because of its biocidal properties and minimal taste and odour. The reaction of chlorine and ammonia in water is: $\text{HCl} + \text{NH}_3 \rightarrow \text{NH}_2\text{Cl} + \text{H}_2\text{O}$

CRYPTOSPORIDIUM: a protozoan parasite found in the gut of vertebrates including humans, which sometimes causes diarrhoeal illness.



NAME:

BLOCK:

STUDENT WORKSHEET – WATER: SOURCE TO TAP

ASSIGNMENT INSTRUCTIONS:

Read the following questions before watching the video and then answer them after watching the video.

1. Where is the water supply area for Greater Victoria?

2. What do CRD Water Services professionals monitor at the Japan Gulch Disinfection Facility?

3. Where is the water disinfected?

4. What are two parasites that could be found in our water before primary disinfection?

5. How is chloramine formed in the water?

6. What is a “multi-barrier” system to protect water quality? What barriers are used by CRD Water Services?

7. What does the CRD laboratory test for to ensure that water quality remains high?



STUDENT WORKSHEET – WATER: SOURCE TO TAP

ANSWER KEY

1. Where is the water supply area for Greater Victoria?

Northwest of Victoria in the Sooke Hills

2. What do CRD Water Services professionals monitor at the Japan Gulch Disinfection Facility?

- *Chlorine residual levels*
- *Turbidity*
- *Water flow*
- *Daily cyclical use of water*
- *UV lamps*

3. Where is the water disinfected?

- *At Japan Gulch Disinfection Facility*
- *At Sooke River Road Disinfection Facility*

4. What are two parasites that could be found in our water before primary disinfection?

- *Cryptosporidium*
- *Giardia*

5. How is chloramine formed in the water?

- *Chloramines are formed when chlorine and ammonia are combined in water*

6. What is a “multi-barrier” system to protect water quality? What barriers are used by CRD Water Services?

- *Protects all aspects of the drinking water process from source supply to the final product from the tap*
- *Watershed is off limits to the public*
- *Trees are planted on slopes to protect against erosion*
- *Floating barriers in front of the intake tower to prevent debris from entering*
- *Adequate treatment via UV, free chlorine, and secondary disinfection (Chloramines)*
- *Extensive water quality monitoring program*

7. What does the CRD laboratory test for to ensure that water quality remains high?

- *Bacteria (total coliforms and E. Coli)*
- *Organics*
- *Turbidity (cloudiness)*
- *Parasites*
- *Taste and odour*
- *Others*

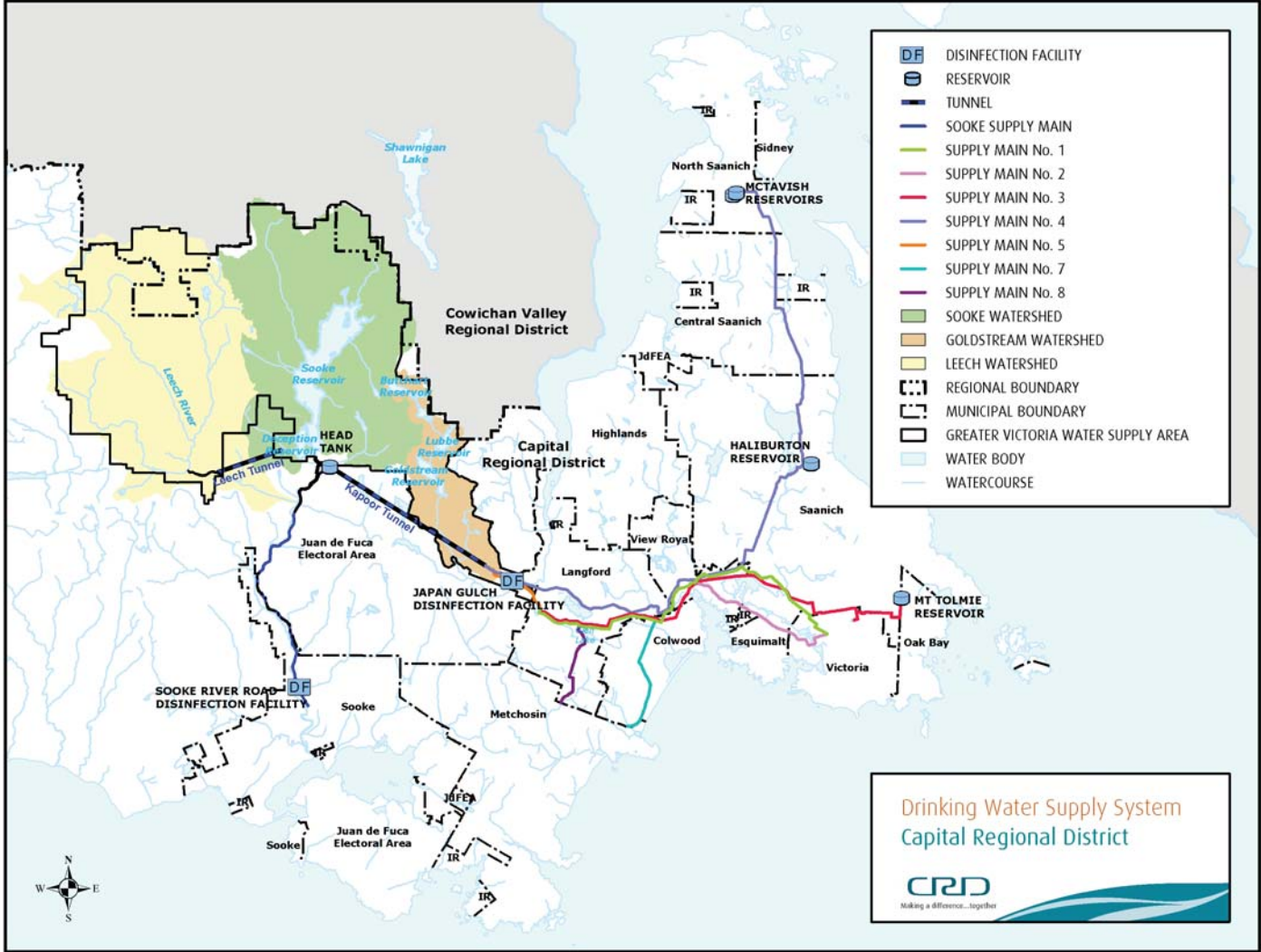


NAME:

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WATER: FROM SOURCE TO TAP - ASSIGNMENT INSTRUCTIONS:

1. With a coloured pencil, mark the outline of the Sooke Reservoir watershed, Leech watershed, Goldstream Watershed that make up the Greater Victoria Water Supply Area.
2. From the Head Tank below the Sooke Reservoir, follow the route of your water supply main from the watershed to your community using a coloured pencil.





NAME:

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WATER: SOURCE TO TAP WORD SEARCH

ASSIGNMENT INSTRUCTIONS:

Find the following water-related words in this puzzle. The words may be spelled out backwards, forwards or even diagonally.

AMMONIA

INTAKE

QUALITY

BACTERIA

WATER

REACTOR

BARRIER

METER

RESERVOIR

BUILDING

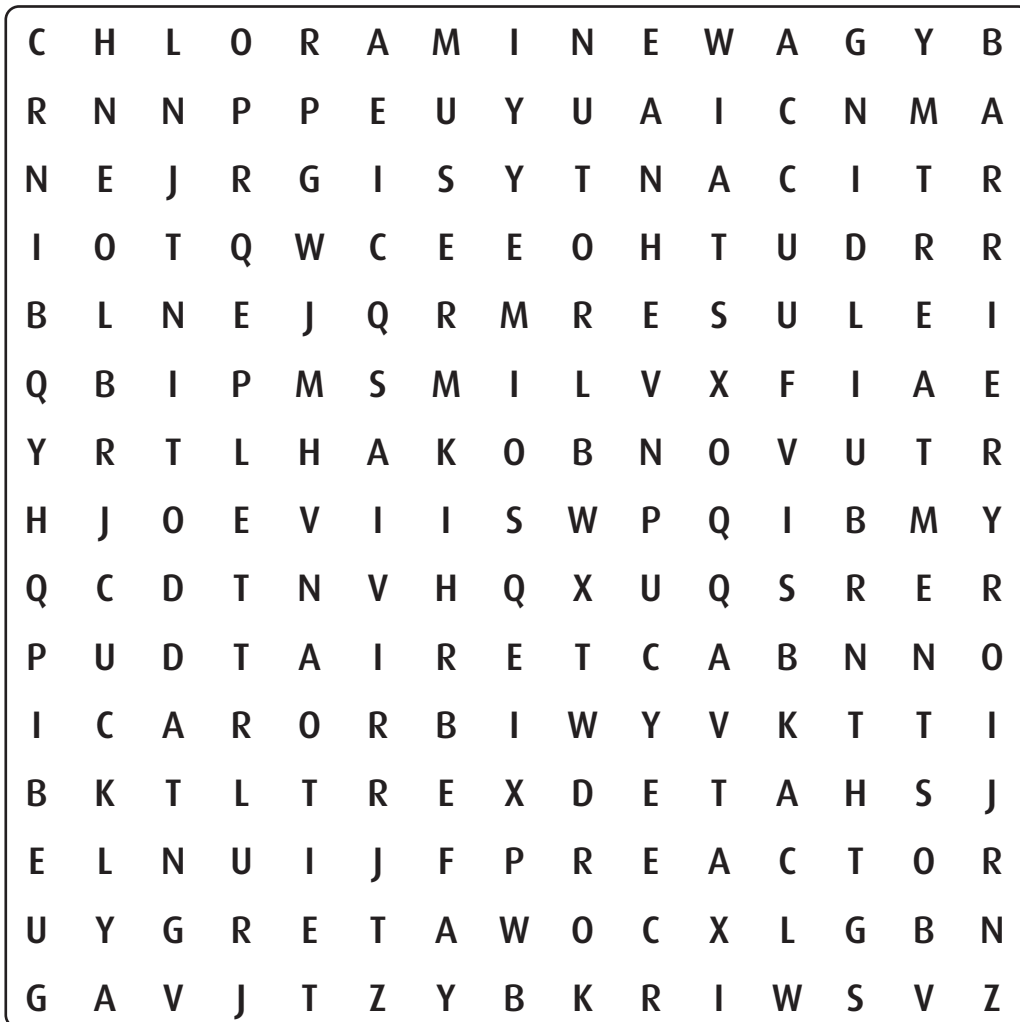
WATERSHED

TREATMENT

CHLORAMINE

OPERATOR

ULTRAVIOLET





WORD SEARCH SOLUTION

