

From Your Source to the Sink

Activity Overview: In this activity, students will demonstrate/re-enact the process of water treatment through an obstacle course. Each station within the obstacle course will consist of different equipment that will represent each stage of Peel's water treatment process.

Objectives:

- Describe the treatment stages that water goes through before it reaches our homes.
- Identify the necessity of treating water before we drink it.
- Identify filtering methods involved in water treatment.

Materials:

Stage 1	15-20 fish, 15-20 plant vines, 2 hula hoops
Stage 2	2 laundry baskets (small)
Stage 3	1 bubble maker, 2 hula hoops
Stage 4	2 carbon filter models, coloured beads, blue marbles
Stage 5	10 membrane filter models (large fabric rolls painted white with stands)
Stage 6	2 black light flashlights, paper with message to uncover

Setup (see diagram below for visual):

Stage 1: Have 2 hula hoops set up beside each other with fish and plant vines a few metres before the hula hoops

Stage 2: Have 2 baskets ready for students to put fish and plants into.

Stage 3: Have 2 hula hoops and bubble maker out.

Stage 4: Have two maze games with 1-3 golf balls in each.

Stage 5: Create 2 zig-zag paths using 5 pool noodles for each path (10 pool noodles in total).

Stage 6: Have black light flashlights and papers with hidden messages laid out. Be careful to make sure these do not blow away.

Takedown: Make sure all materials are placed in the bins once the activity is complete for the day.

Safety:

- If it is windy, you may need to hold on to the balls.

What will I be doing? (Procedure)

*Before you start your presentation check with the teacher or chaperone that the entire group is present and ready to start. Remember that **doing** an activity is more powerful than watching and listening to someone, so try to involve as many children as possible.*

Say: "Welcome to **From Your Source to the Sink!** This obstacle course will help us understand how water is cleaned. In Peel, tap water is clean and safe to drink because it goes through a very important process before it reaches us."

Ask: "Do you know where your water comes from?"

Answer: "Brampton, Mississauga, and Caledon's water comes from Lake Ontario."

Ask: “Would you drink the water straight from the lake?”

Many students will think it’s a bad idea, so ask them the following:

Ask: “What’s wrong with the water?” “Is it the same water that comes out of our faucet/tap?” “If it is a bad idea to drink water straight from the lake, then why is it OK to drink water from the tap but not from the lake?”

Answer: “Water in the lake is not safe to drink because it is not clean and could make you really sick. Tap water in Brampton, Mississauga, and Caledon is safe to drink because the water has gone through Peel Region’s water treatment facility which cleans the water.”

Tell the students: “For our activity, you are going to be acting as water molecules from Lake Ontario. The obstacle course represents the water treatment facility; each section will be a stage in the water treatment process. We are going to start the obstacle course as ‘dirty’ water molecules that come straight from Lake Ontario. Then, we will go through the process it takes in order to become clean and safe drinking water. First, we are going to split you up into two groups, and then we will show you how to complete the course.”

Split the students into two even groups.

*The following describes the different stages that the students will travel through in their water treatment process. ****Before allowing the students to do the obstacle course, one high school volunteer should explain each stage, while the second volunteer demonstrates it for the students to understand.*****

STAGE 1- Raw Intake Pipe

Tell the students:

“The first stage is removing water out from Lake Ontario using a very large pipe. This water will contain things like fish and plants from the water”

“Your job for the first stage of the obstacle course is to grab one fish and one plant, and hula hoop 5 times. The hula hoop represents the intake pipe. Only one person can do this at a time!”

STAGE 2- Screening

Tell the students:

“In the second stage, there is a screen at the end of the pipe that removes objects larger than 1cm.”

“Screening means we remove things we do not want in our drinking water like the fish and plants. Your job is to put your fish and plant into the baskets here.”

STAGE 3 – Ozone Disinfection

Tell the students:

“The third stage involves strong ozone gas that disinfects the water to deactivate harmful bacteria. The ozone gas moves through the water and creates bubbles.”

“Your job is to now bring your hula hoop in front of the bubble makers and hula hoop 5 times to demonstrate the deactivating gas in the tank.”

STAGE 4- Biologically Activated Carbon Contactors

Tell the students:

“Now in stage 4, water flows through carbon tanks to remove any organic material in the water. This step is very important to make our water taste good and not smell bad.”

“At this stage, you will gently shake the carbon filter model so that all the blue marbles fall into holes. This represents water passing through the carbon filter.”

STAGE 5 - Membrane Filtration

Tell the students:

"In the fifth stage, water passes through a membrane fibre, and its job is to filter out bad stuff we don't want in our water. The holes in the fibres are only big enough for water to pass through and any bacteria and viruses get trapped on the outside."

"In this stage, you will maneuver through a path of membrane filter models."

STAGE 6 - UV Light

Tell the students:

"Now we reach stage 6 and the last stage of the course. In this stage, water is disinfected by passing through UV light. The UV lights look like long lightbulbs similar to what might be used at your school. When bacteria and viruses are exposed to the UV light, they become inactive and are not harmful anymore."

"You will use the black light flashlight to uncover a secret action to follow and show the volunteer before you complete the course." The action in invisible ink will read: *Make a water drop shape with your arms or hands.*

STAGE 7 - Chlorination

Tell the students:

"In the last stage in this process, chlorine is added to make sure the water does not have any harmful bacteria and so that it stays clean all the way from the treatment facility until it reaches your tap."

After all stages have been demonstrated, say:

"Please line up in your groups at the start of the course. When I say go, one person from each team can start, and the next person can go once they have reached the second stage. Is everyone ready?"

Students can now go through the course in their teams.

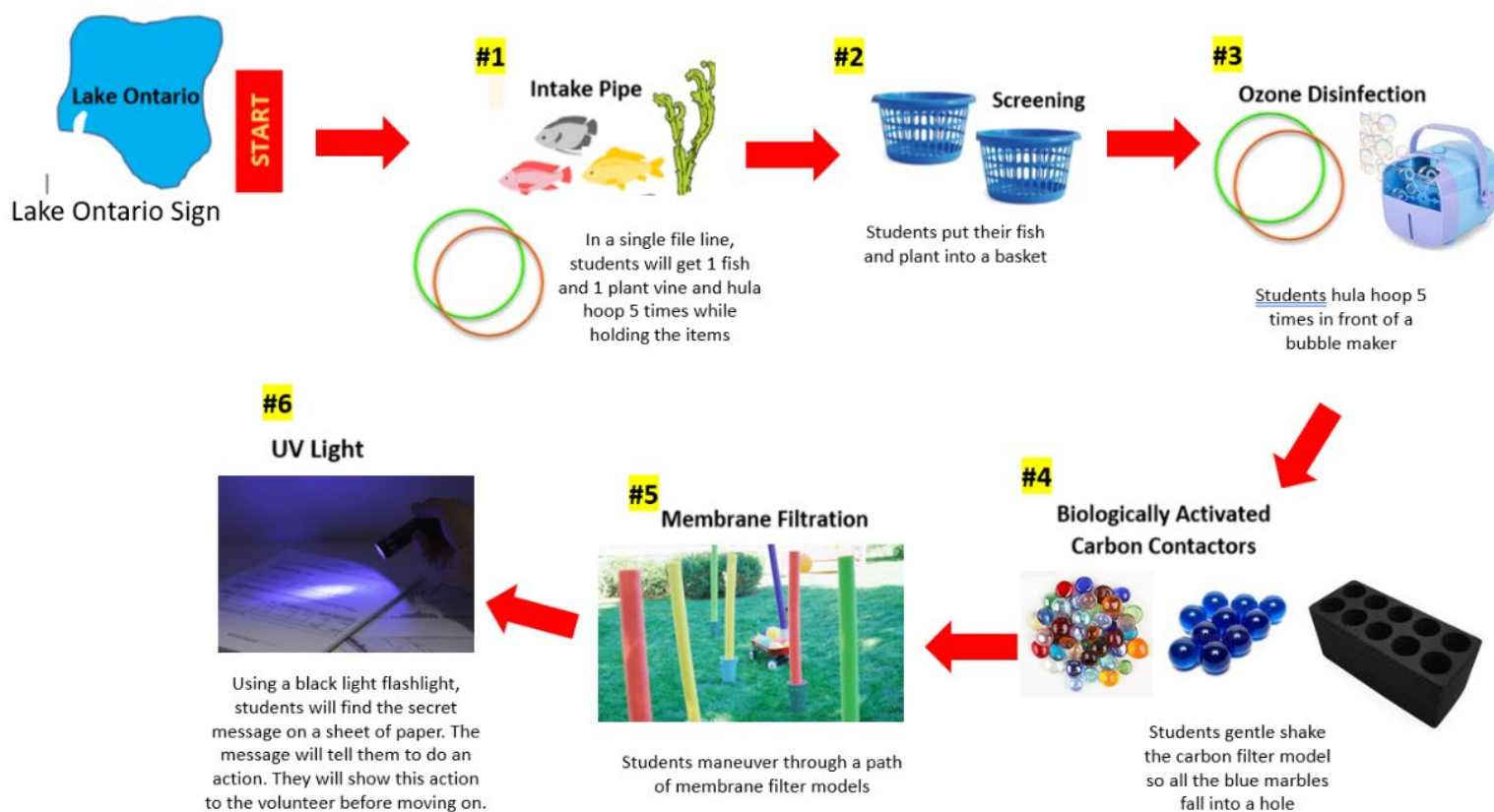
After all students have gone through, say:

"Congratulations! You have all successfully gone through the water treatment process and are now clean water molecules! Now, when you drink water from the tap, you will remember that it has gone through many steps to be clean and safe enough to drink."

Specifically remind students that:

- In Peel, tap water is clean and safe to drink because it goes through a very important process before it reaches us.
- You should strive to become better stewards of our water by using it wisely and protecting its quality.

Diagram of Setup



Background Information (for high school student reference)

- **Biologically Activated Carbon Contactors:** Water passes through the carbon tanks to remove any organic material that is in the water. This stage helps with the taste and odour of the water.
- **Membrane Filtration:** Water passes through tiny fibres that look almost like cooked spaghetti. Along the fibres are tiny holes that only water molecules can get through and bacteria and viruses get trapped on the outside. Below is a picture of a water operator pulling out one of the membrane filter cassettes. You can see all the fibres that make up the cassette.
- **UV Light:** The filtered water then passes through the UV units, which disinfects the water by inactivating the microorganisms. This means that when the bacteria and viruses are exposed the UV light they cannot reproduce and are no longer effective.
- **Chlorination:** Chlorine is added at concentrations that comply with the Ontario drinking water legislation.

Vocabulary

Screening - Removes things larger than 1cm- things that made it past the intake pipe screen

Membrane Filtration - Small particles and microorganisms are removed through membrane fibres

UV Light - Filtered water passes through the Ultraviolet (UV) units, which disinfects the water by inactivating microorganisms. This step helps with taste and odour

Granular Activated Carbon Contactors - Water flows down through the carbon bed which helps with taste and odour

Chlorination - Chlorine is added to ensure the water stays clean as it travels through pipes to get to our homes