

Operation Water Drop



Class Handout for Grades 9 - 12 Lesson 1 - What Is Drinking Water Quality?

There are two major sources of water:

- Groundwater - found below the ground where it accumulates in between soil and rocks. The volume of water can range from small to very large similar to above ground creeks, rivers and lakes, found in bodies of water that resemble underground lakes called aquifers.
- Surface water - found on the earth's surface in lakes, rivers, dugouts and reservoirs

Drinking water should be:

- Clear
- Colourless
- Odourless

Drinking water should not contain:

- Disease causing micro-organisms
- Harmful chemicals

What else might be in drinking water?

- Nutrients
- Chemicals
- Inorganic compounds (Iron, Arsenic, Sulfate)
- Organic compounds (Broken down plant material, pesticides)

Where do contaminants come from?

- Erosion of rock and soil
- Landfills
- Sewage
- Wastewater treatment plants
- Farmland
- Residential discharges
- Industrial discharges
- Intense livestock operations
- Motor boats such as Jet-skis



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Effects of contaminants in drinking water

- *Aesthetic* - Tastes, smells or looks bad; can cause stains on laundry, sinks, toilets and bathtubs
- *Cosmetic* - Visible illnesses (skin rashes, or mottling of teeth)
- *Acute* - Effects seen within hours (diarrhea and/or vomiting)
- *Chronic* - Serious health issues with no symptoms (liver disease, cancer)

Minerals, nutrients and chemicals can affect human health

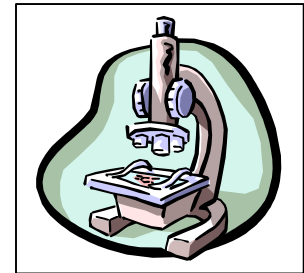
- As water moves, it dissolves and carries with it things it contacts
- Many salts and minerals found in water are necessary for our bodies, but at certain levels, can be considered contaminants

Microorganisms and human health

Microorganisms are small, living organisms that can make you sick, including:

- Bacteria - *E. coli*
- Protozoa - *Cryptosporidium*
- Viruses - *Hepatitis A*
- Algae - *Microcystis*

However, not all microorganisms found in water can make you sick.



Some minerals and nutrients affect human health

- High levels of sulfates and other salts can cause diarrhea
- Nitrates can cause death in babies
- High levels of arsenic can cause heart disease and cancer
- High levels of ammonium cause chlorination to be less effective

Chemicals can affect human health

- Many of the harmful chemicals are manmade
- Some examples include farm chemicals (pesticides), oil and gas industry (xylenes), or the breakdown of plastics in landfills (PCB's)
- Effects may include: liver or kidney damage, cancer



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How do we make our water safe?

- Monitor the water supply
- Test for harmful particles
- Apply appropriate treatment before drinking the water
- Protect the source of the drinking water

Treatment

- All water should be treated before drinking
- No one treatment system is perfect for every water source
- Problems with the water must be identified and treated appropriately, then monitored regularly to ensure continued safety
- Of the community samples you tested, are appropriate treatment processes in place?

Who is responsible for the safety of your drinking water?

- **Cities:** City
- **Rural communities:** Municipality
- **On Farms:** Nobody
- **First Nations communities:** Federal government and the community

Differences between Rural and Urban Water

- Cities can have water tested daily in treatment plants
- Rural and/or First Nations may have water tested twice a year
- Rural communities get water from wells and/or spring runoff, and sometimes ponds; while in the city, water usually comes from rivers or large lakes
- Urban water sources are usually of better quality than Rural or First Nations water sources
- Rural community water sources may face the following problems: livestock contamination, spring flooding, leaching into their wells, etc.



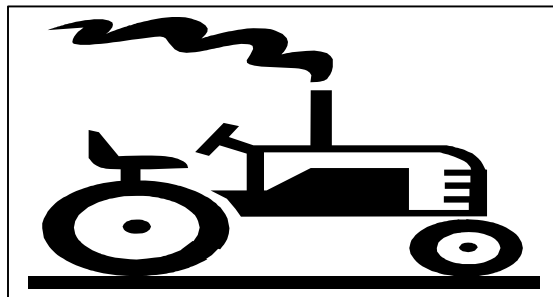
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Interesting facts about drinking water

- There are still communities and some cities, such as Halifax, that discharge raw sewage into its own harbour
- Septic tanks in rural areas are not inspected
- Septic tanks in rural areas are not always emptied by a licensed operator
- Cattle are allowed to drink from human source waters
- Fish farms may operate in human source waters, for example in Lake Diefenbaker where the city of Saskatoon, SK draws its water
- Doctors don't always recognize and test for waterborne illnesses
- Stats Canada records all water-related statistics based on the place of water treatment and not the place of water origin
- Just adding chlorine to your water does not make it safe
- The Federal Government does not regulate or make sure that all Canadian citizens have safe drinking water
- Water is often tested for just a few parameters despite there are around 60 Canadian drinking Water guidelines dealing with health



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