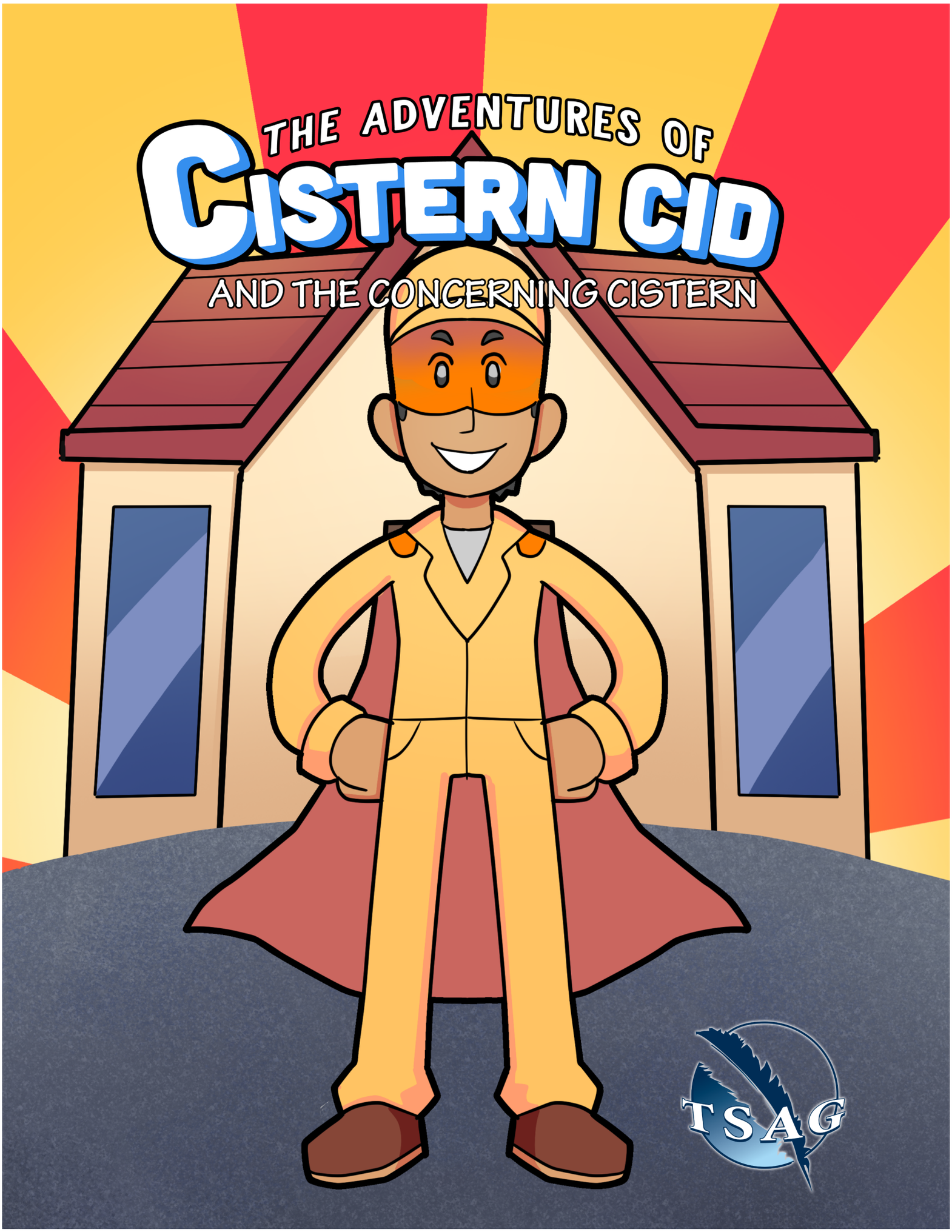
THE ADVENTURES OF
CISTERN CID
AND THE CONCERNING CISTERN
TSAG

This comic is the fourth in a series of comic books created by First Nations Technical Services Advisory Group to teach students in grade 3-6 about the Superheroes that make and keep our water safe to use.

PDF copies of this booklet and other educational materials are available from TSAG.

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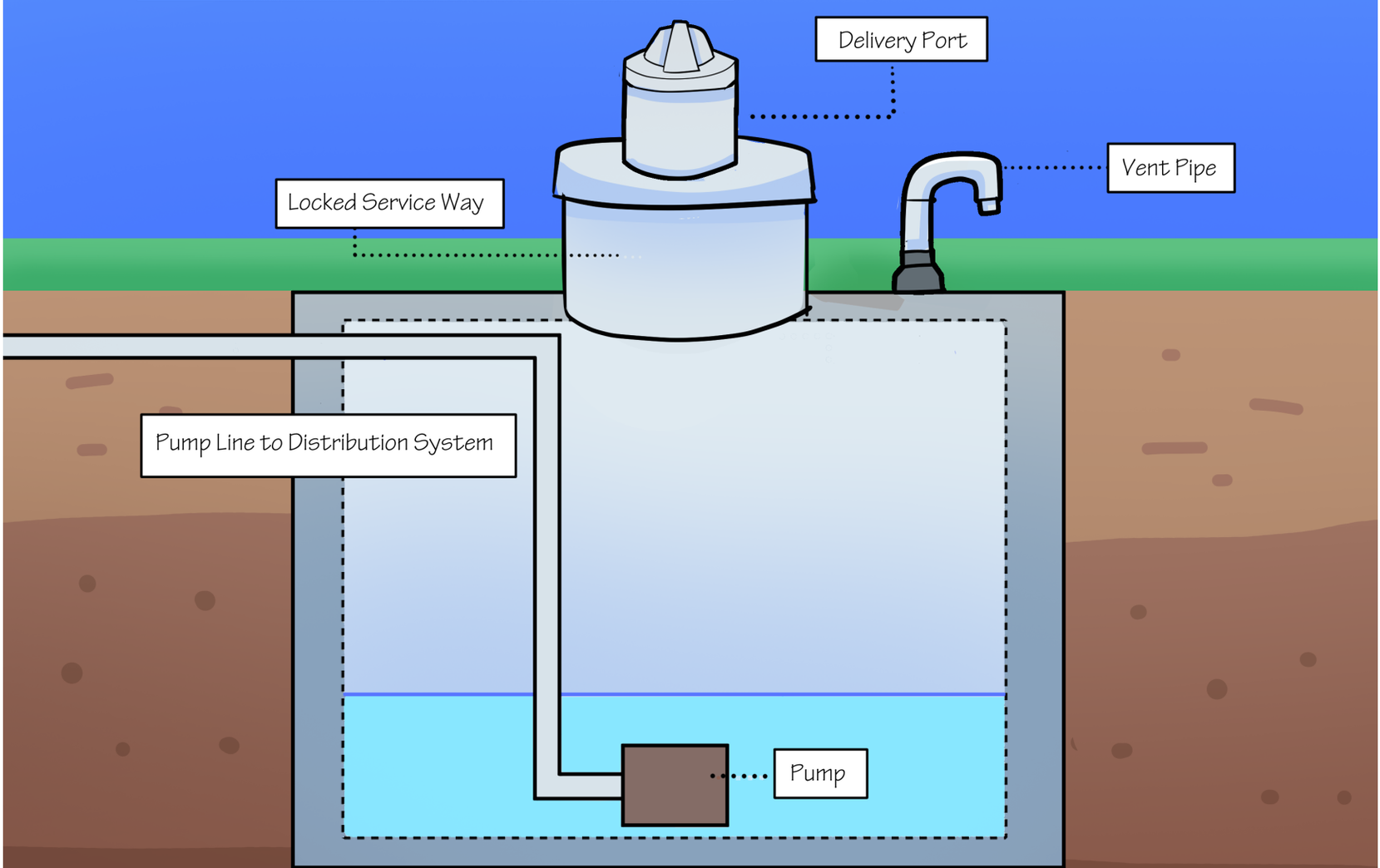
What is a Cistern?

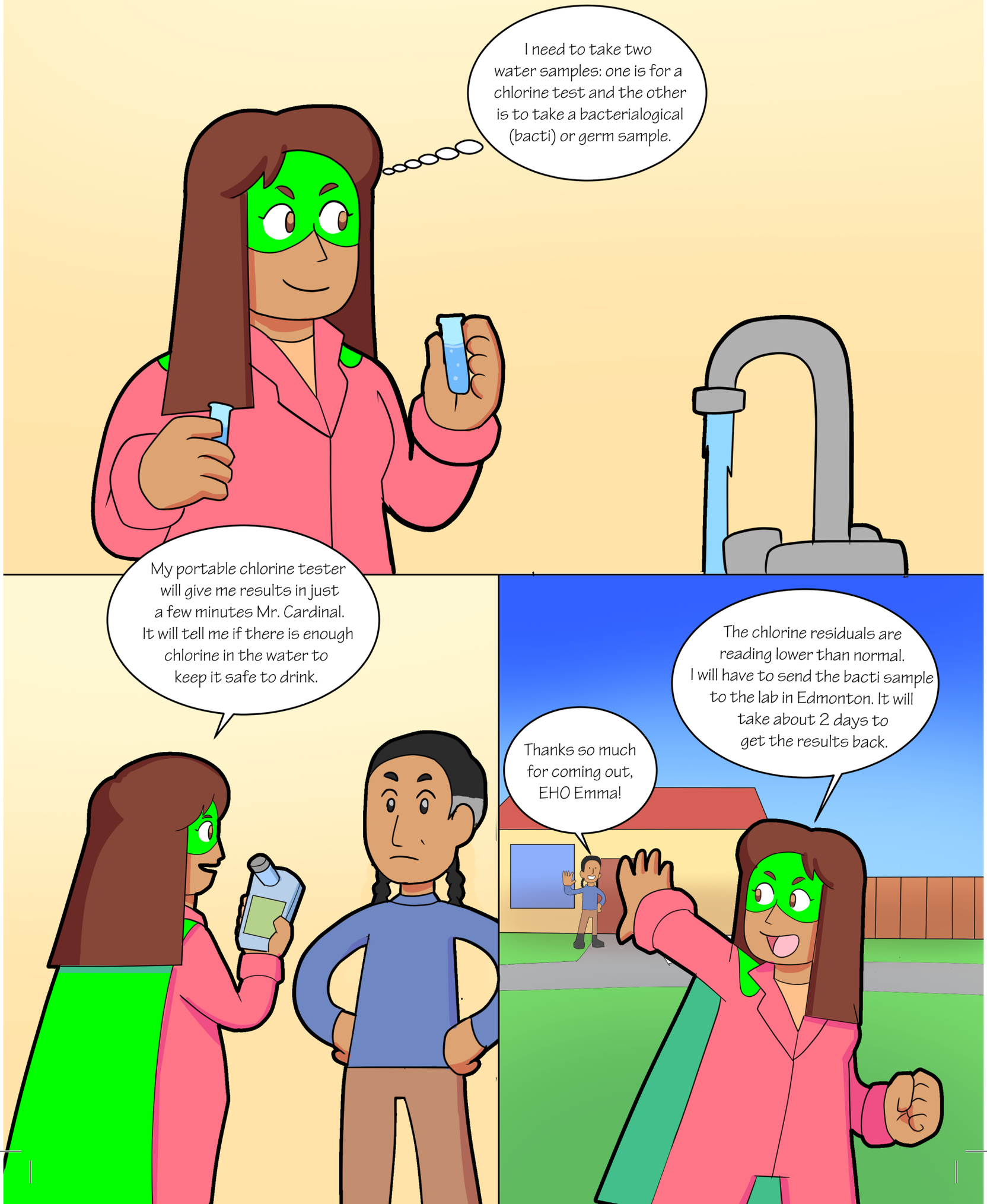
A cistern is a large watertight container that stores water. They are used in rural areas where there is no municipal water service. They are made of concrete, steel, plastic, or fiberglass. Cisterns can be built right into homes, into the ground, or built as towers. Cisterns are filled by a water truck.

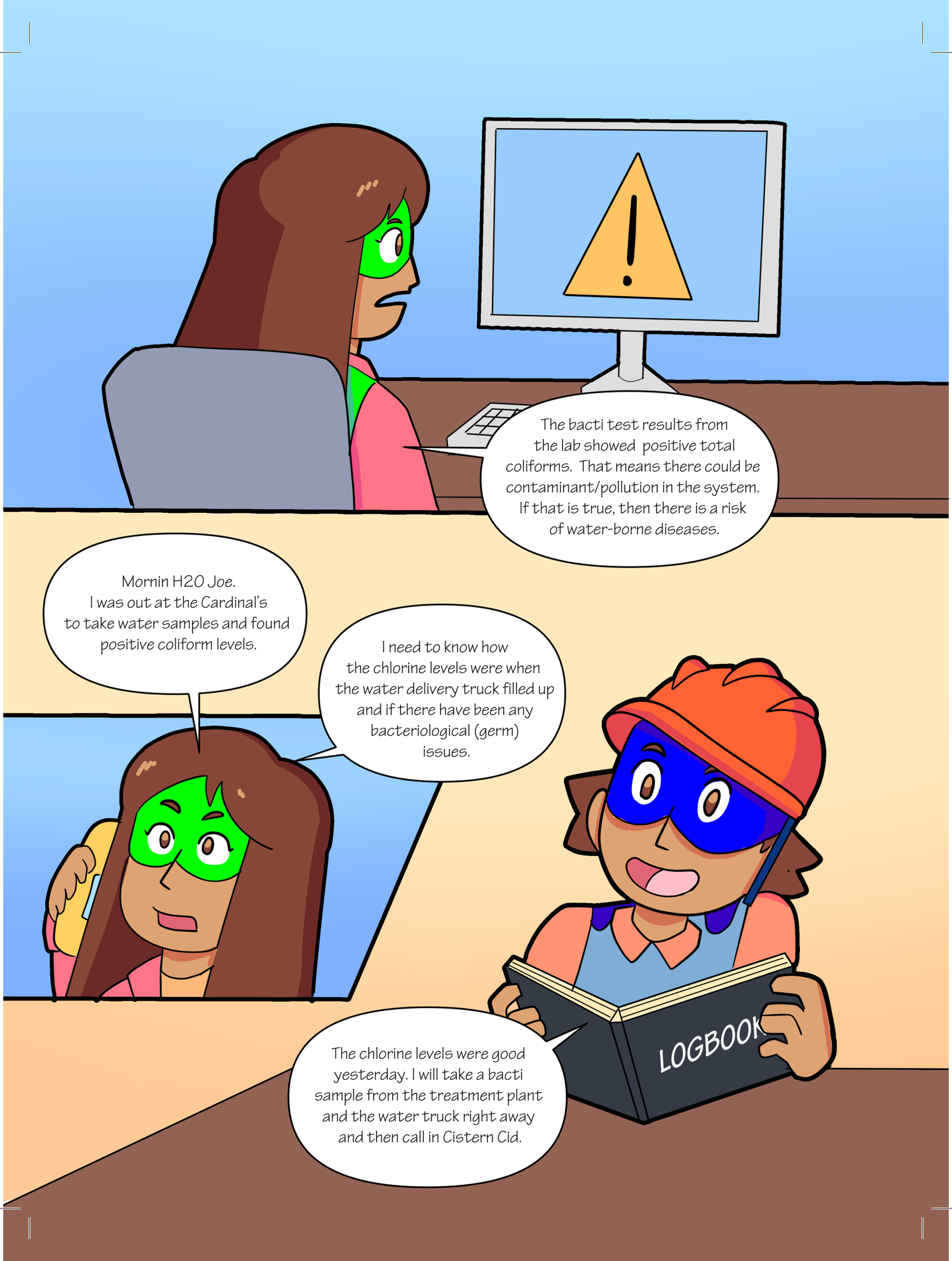
The average size of a cistern is 4 metres in length and 3 metres wide. They can hold between 5000 and 15,000 litres of water. The size of the cistern that people have depends on how many people are living in the home.

On average, a family of three uses about 750 liters of water daily. A cistern is usually filled every 2 weeks.

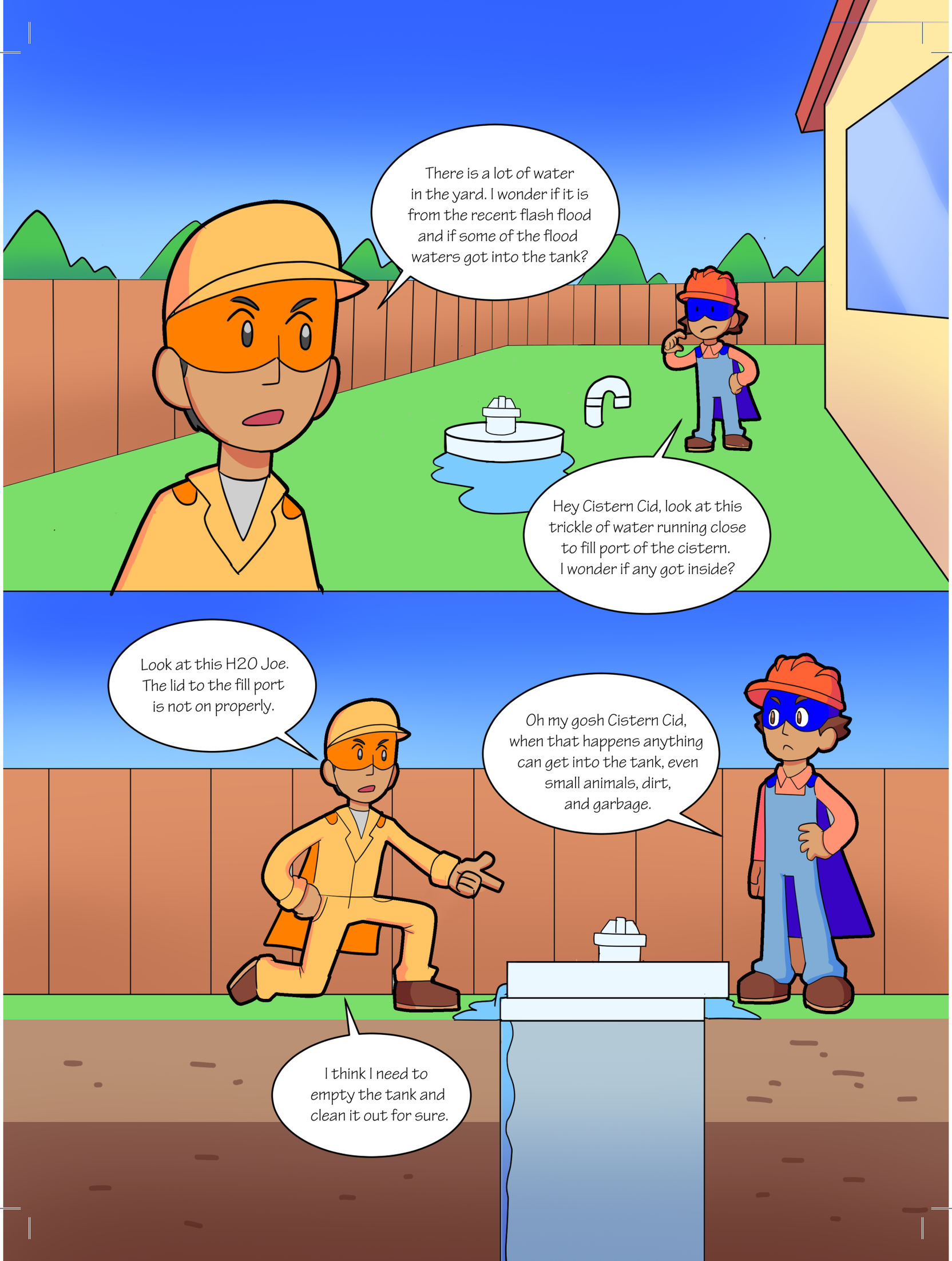


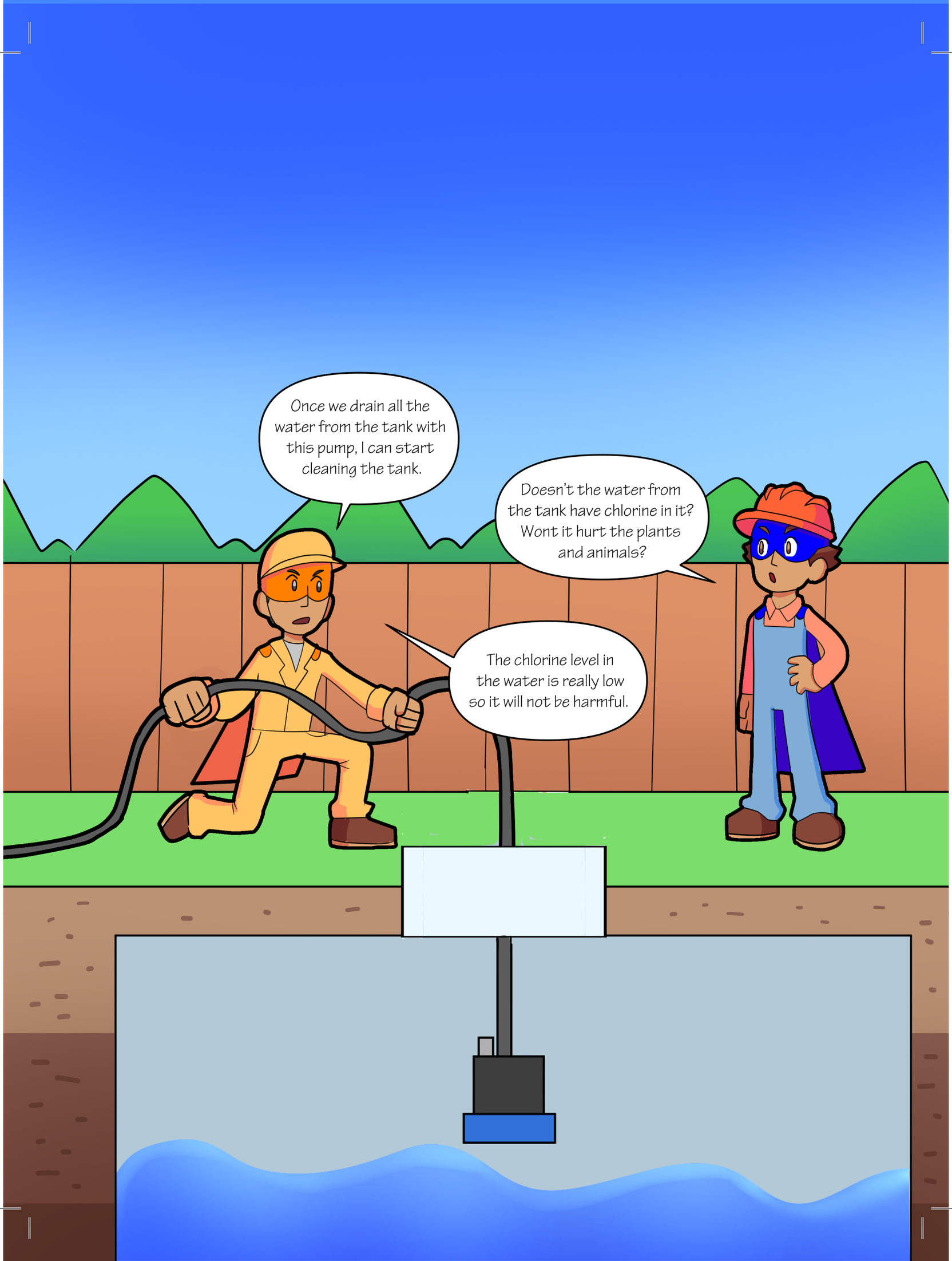

In many rural Alberta communities the homes have cisterns. It is important to keep the water in the cistern clean. The water can get germs in it when the lids or vents get damaged or aren't put on properly; when the cistern itself gets damaged; or when there is flooding.
To make sure that the water is safe to drink. EHO Emma or one of the Water Monitors that she works with, visit each home several times a year to take water samples.


I need to take two water samples: one is for a chlorine test and the other is to take a bacterialogical (bacti) or germ sample.
My portable chlorine tester will give me results in just a few minutes Mr. Cardinal. It will tell me if there is enough chlorine in the water to keep it safe to drink.
The chlorine residuals are reading lower than normal. I will have to send the bacti sample to the lab in Edmonton. It will take about 2 days to get the results back.
Thanks so much for coming out, EHO Emma!

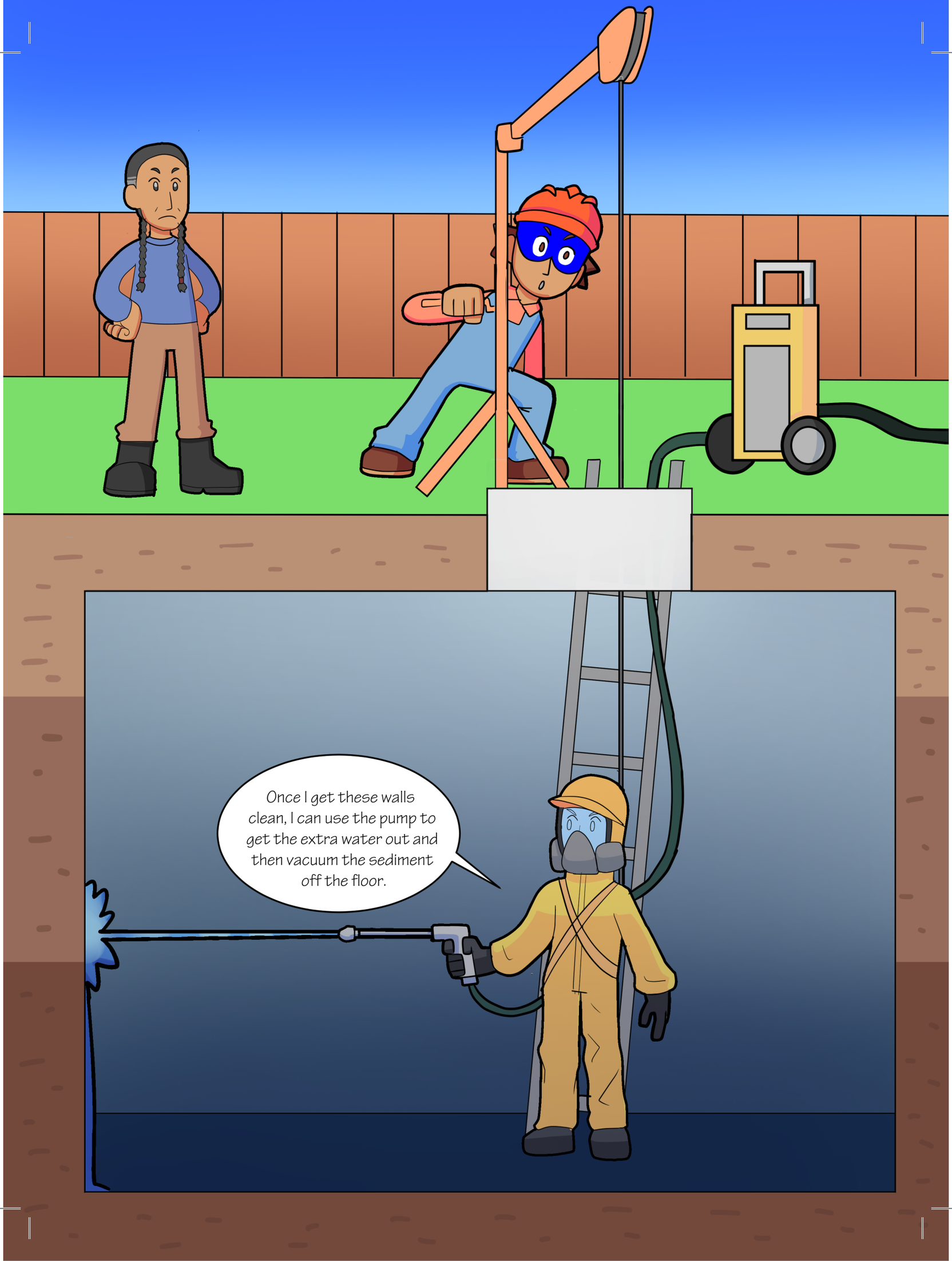

The bacti test results from the lab showed positive total coliforms. That means there could be contaminant/pollution in the system. If that is true, then there is a risk of water-borne diseases.
Mornin H2O Joe. I was out at the Cardinal's to take water samples and found positive coliform levels.
I need to know how the chlorine levels were when the water delivery truck filled up and if there have been any bacteriological (germ) issues.
LOGBOOK
The chlorine levels were good yesterday. I will take a bacti sample from the treatment plant and the water truck right away and then call in Cistern Cid.


Hey Cistern Cid. Just got a call from EHO Emma and she took a bacti test at the Cardinal's place and it showed positive for coliforms. You are going to have to clean out and disinfect their tank asap.
Wow, that is a bit of a worry. I will meet you there.
Thanks for coming, Cistern Cid!
No problem H2O Joe. Always happy to help. Let's get this problem solved.
You betcha!

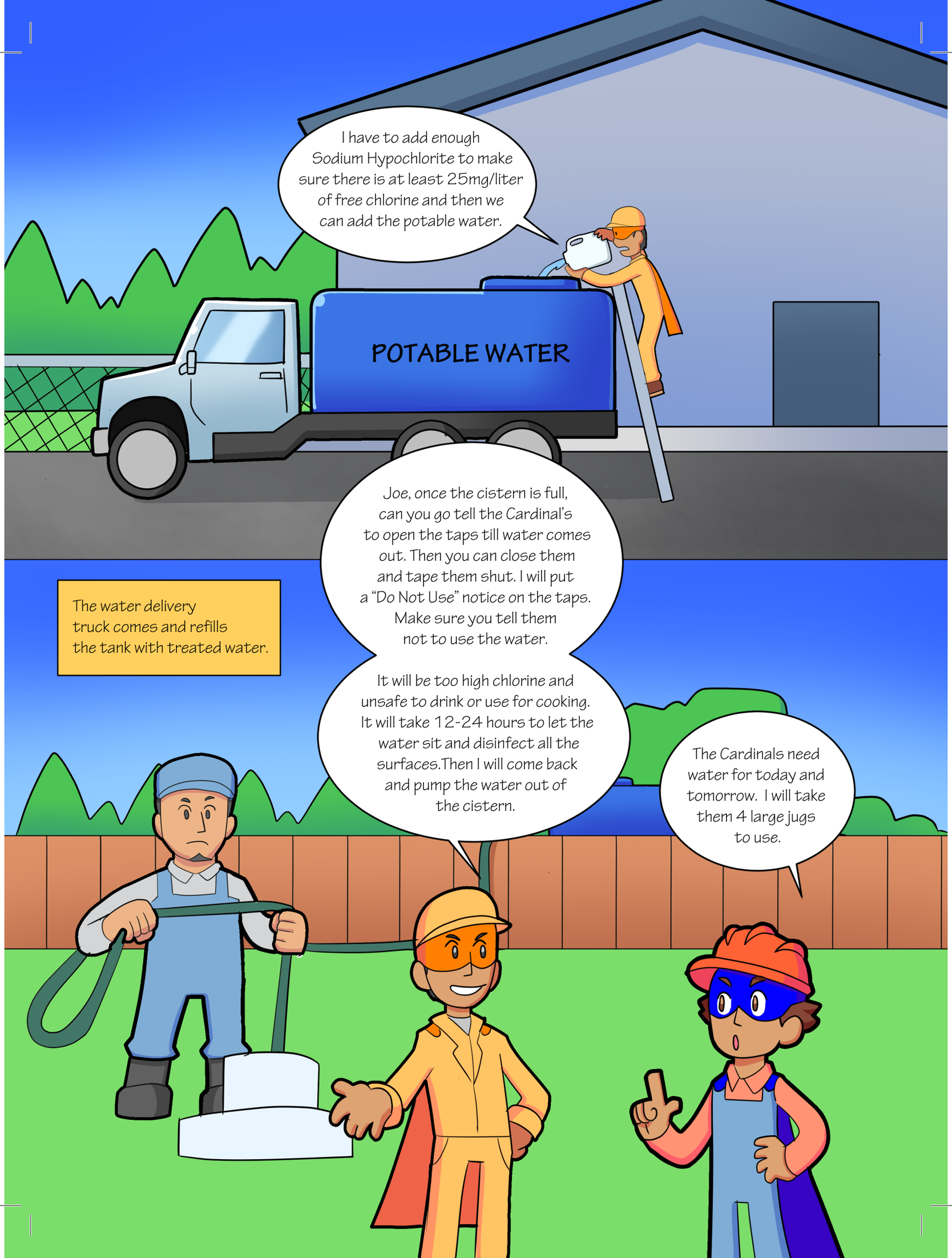

There is a lot of water in the yard. I wonder if it is from the recent flash flood and if some of the flood waters got into the tank?
Hey Cistern Cid, look at this trickle of water running close to fill port of the cistern. I wonder if any got inside?
Look at this H2O Joe. The lid to the fill port is not on properly.
Oh my gosh Cistern Cid, when that happens anything can get into the tank, even small animals, dirt, and garbage.
I think I need to empty the tank and clean it out for sure.

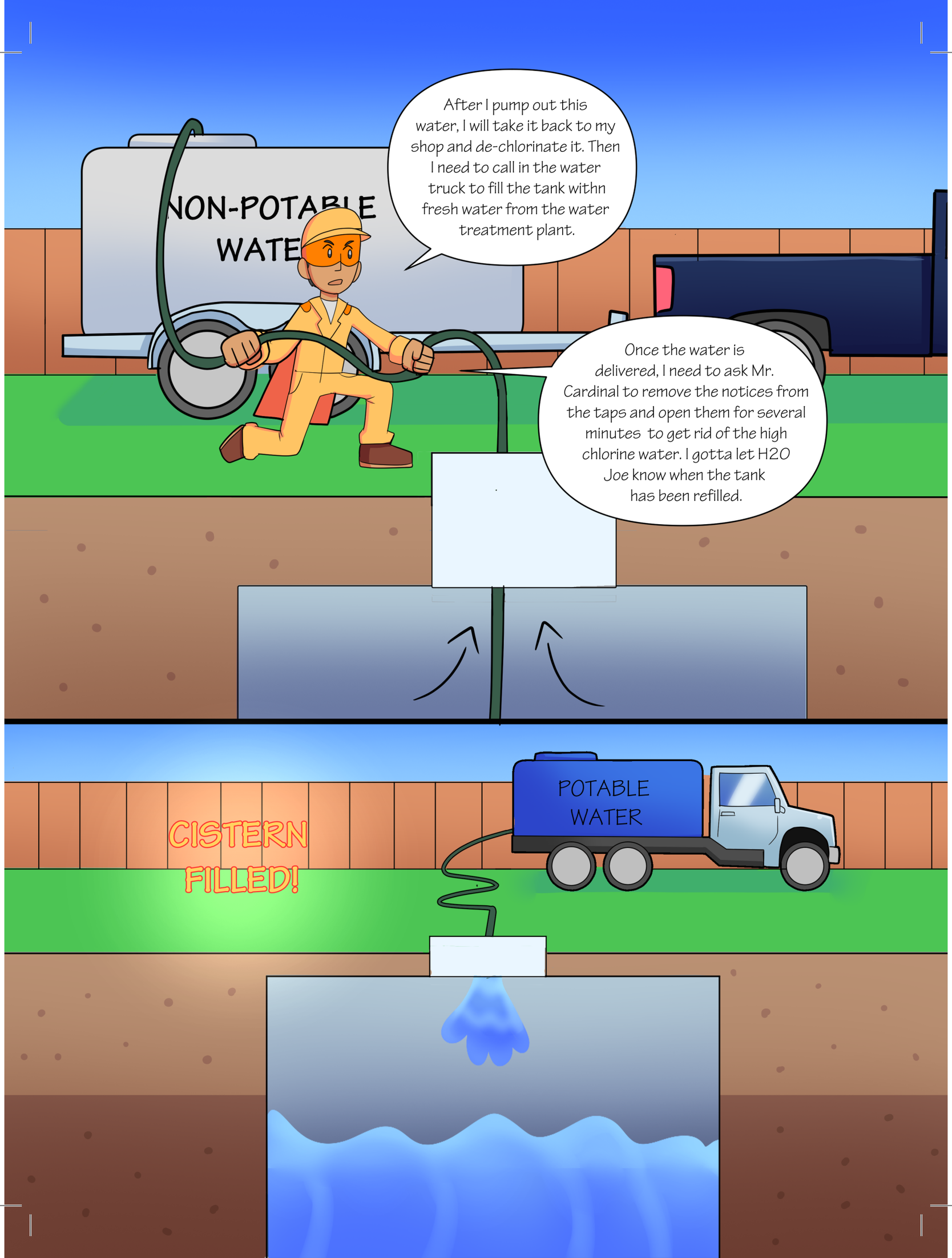

Once we drain all the water from the tank with this pump, I can start cleaning the tank.
Doesn't the water from the tank have chlorine in it? Wont it hurt the plants and animals?
The chlorine level in the water is really low so it will not be harmful.

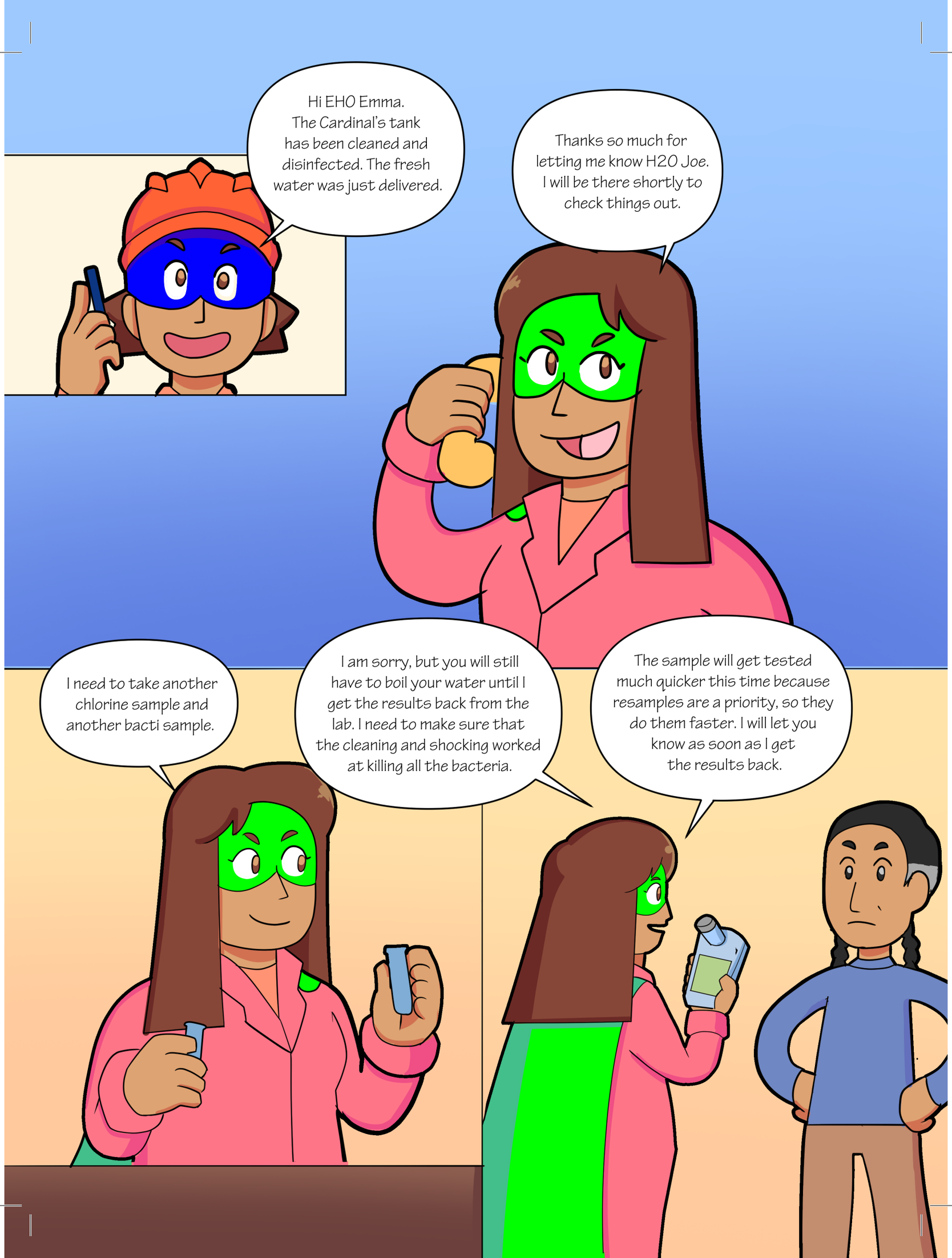

What is the next step, Cid?
I am going to have to enter the cistern to clean it. It is a confined space, so I have to take special precautions. I need to make sure the air quality is safe, so I'll blow fresh air into the cistern for about 15 minutes to get rid of the gases.
Then I'll lower the gas monitor down with a rope to take an air quality reading and make sure the air is safe. If the air quality reading is safe, then I can go in. I also need to wear Personal Protective Equipment (PPE) .
I'll need you to help me enter the cistern. As I climb down the ladder, you need to lower me using the tripod and winch. We'll need to ask Mr. Cardinal to keep watch while we work cause you need 2 people on the surface when you do a confined entry.
That sounds like a lot of work to stay safe!

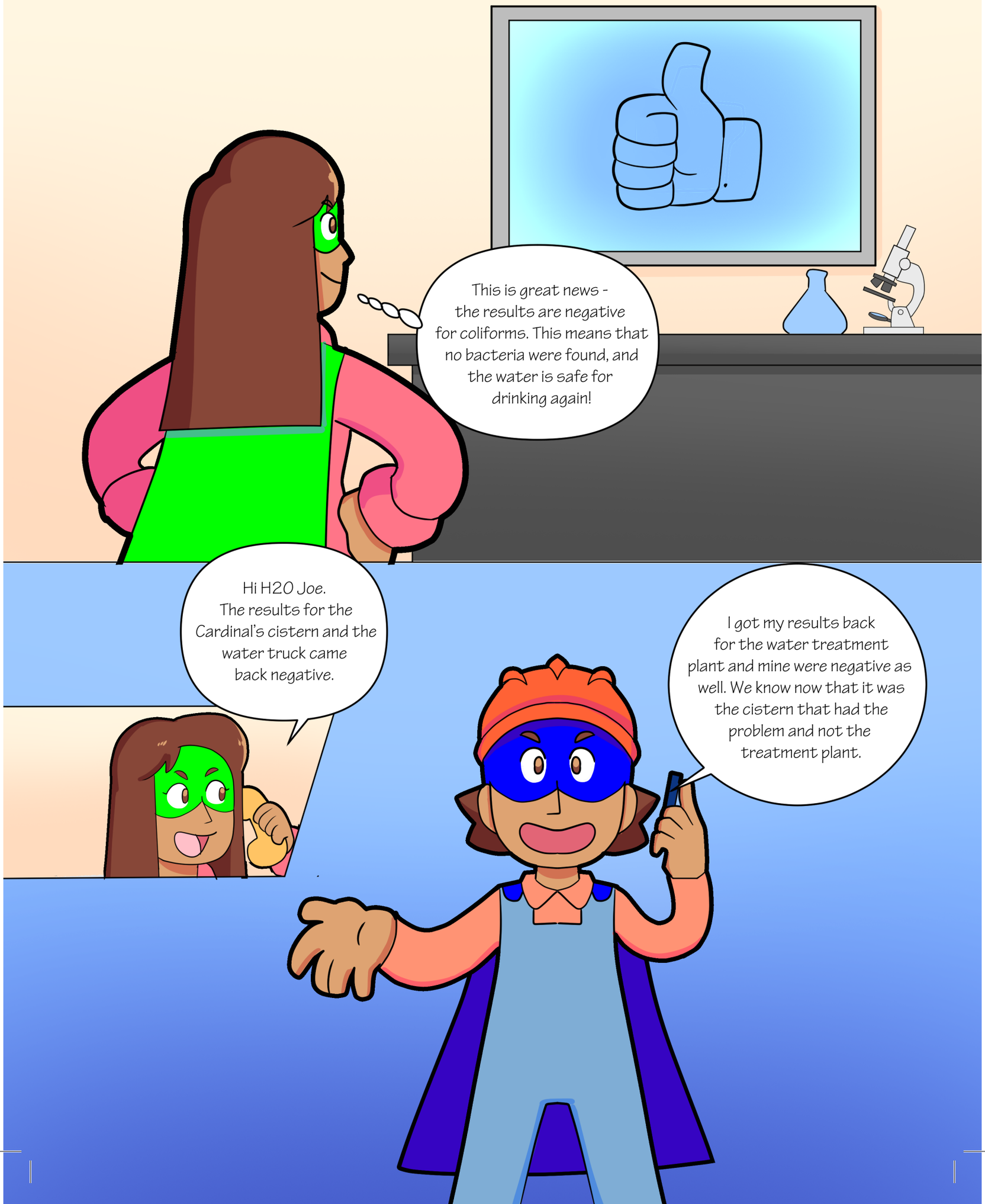

Once I get these walls clean, I can use the pump to get the extra water out and then vacuum the sediment off the floor.


H2O Joe, can you lower down the pump and shop vac so I can finish cleaning and remove the dirty water at the bottom of the cistern.
I still need to add enough chlorine to the cistern to make sure there is at least 25 mg/liter of free Chlorine and then we can add the potable water. This is called "shocking the system."
We do it to clean every part of the tank and pipes that the water touched in case they got contaminated. The high chlorine content will kill any bacteria buildup on those surfaces.


I have to add enough Sodium Hypochlorite to make sure there is at least 25mg/liter of free chlorine and then we can add the potable water.
POTABLE WATER
Joe, once the cistern is full, can you go tell the Cardinal's to open the taps till water comes out. Then you can close them and tape them shut. I will put a "Do Not Use" notice on the taps. Make sure you tell them not to use the water.
The water delivery truck comes and refills the tank with treated water.
It will be too high chlorine and unsafe to drink or use for cooking. It will take 12-24 hours to let the water sit and disinfect all the surfaces.Then I will come back and pump the water out of the cistern.
The Cardinals need water for today and tomorrow. I will take them 4 large jugs to use.

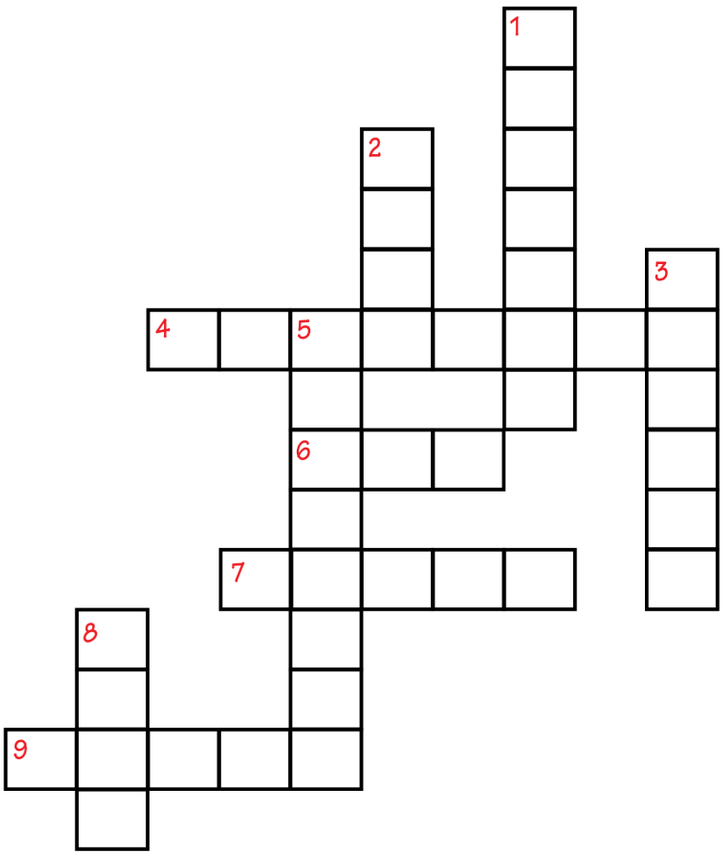

NON-POTABLE WATER
After I pump out this water, I will take it back to my shop and de-chlorinate it. Then I need to call in the water truck to fill the tank withn fresh water from the water treatment plant.
Once the water is delivered, I need to ask Mr. Cardinal to remove the notices from the taps and open them for several minutes to get rid of the high chlorine water. I gotta let H2O Joe know when the tank has been refilled.
CISTERN FILLED!
POTABLE WATER


Hi EHO Emma. The Cardinal's tank has been cleaned and disinfected. The fresh water was just delivered.
Thanks so much for letting me know H2O Joe. I will be there shortly to check things out.
I need to take another chlorine sample and another bacti sample.
I am sorry, but you will still have to boil your water until I get the results back from the lab. I need to make sure that the cleaning and shocking worked at killing all the bacteria.
The sample will get tested much quicker this time because resamples are a priority, so they do them faster. I will let you know as soon as I get the results back.


This is great news - the results are negative for coliforms. This means that no bacteria were found, and the water is safe for drinking again!
Hi H2O Joe. The results for the Cardinal's cistern and the water truck came back negative.
I got my results back for the water treatment plant and mine were negative as well. We know now that it was the cistern that had the problem and not the treatment plant.


Hi Mr. Cardinal.
I got the results back and your water is now safe to cook with and drink without having to boil it first.
This is great news!

Cistern Safety



Down:

1. A large container of water
2. Something Emma does to find out what is wrong with the water
3. A measure for liquid
5. A chemical added to water to clean it
8. This happens when something gets stuck in a pipe

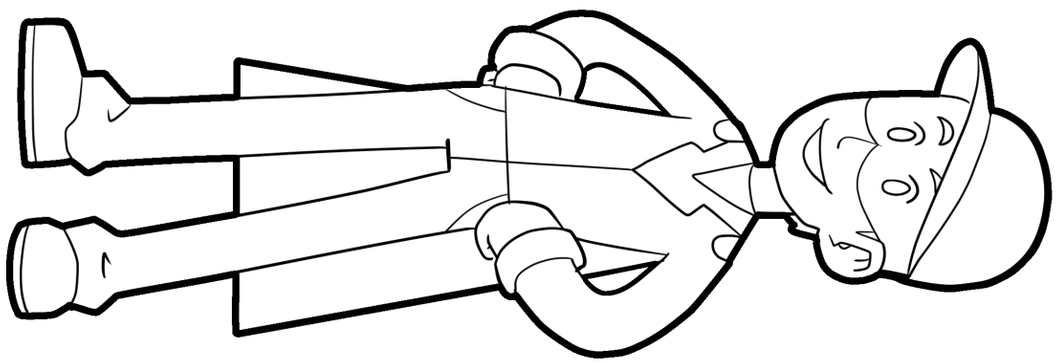
Across

4. Small things that get into water and can make us sick
6. A place where the water sample is sent to get tested
7. Something we do with water
9. A small rodent that can get into your house or cistern

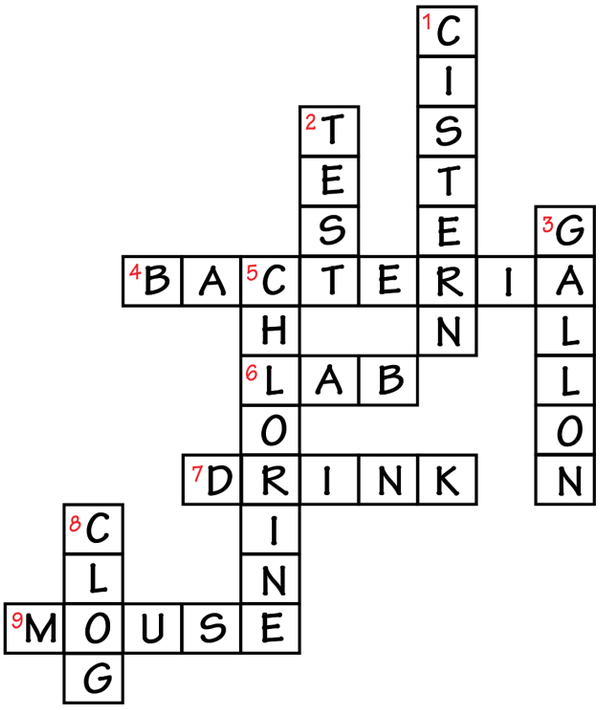
Tear-Out Page:

Cistern Cid

Turn the page



Crossword Answers



Cistern Facts

- The Basilica Cistern in Turkey is the largest cistern in the world. It is 138 meters long and 65 metres wide. It can hold 1.9 million imperial gallons of water.
- Some farmers use cisterns to store water during dry seasons so that they can irrigate their crops and feed their livestock.
- Fiberglass and plastic cisterns need to be anchored because they can float up if they are empty and there is a high-water table surrounding the tank. They also need reinforced walls to keep their structure. They can buckle from the weight of the ground above them or if there is too much pressure from ground water.

Cistern Safety

- Never leave a cistern uncovered. Small rodents can get in and drown. As they decompose, the water becomes unsafe to drink.
- Never leave old cisterns open and unattended. Children are naturally curious and can easily fall into cisterns and can be injured.
- Monitor your cisterns for leaks. Small leaks can become large leaks and water can easily flood a basement.
- Monitor the pressure and taste of your water. The pipes in cisterns using hard water can become clogged with mineral deposits.
- Cisterns that are built-in basements can contribute to moisture issues and mould.
- Clean your cisterns once a year.
- Never park within 5 feet of a cistern. The weight could cause damage to the cistern (such as cracks).
- Children should never play with the lids or screens on a cistern. Opening them, putting objects into them, or touching them can lead to the contamination of the water.

See you again for H2O Joe's next adventure!