LEVELED BOOK • O

What Happens When You Flush?

MULTI LEVEL O•R•U

Written by Lisa Meltzer

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Focus Question

Where does sewage go, and how is it treated?

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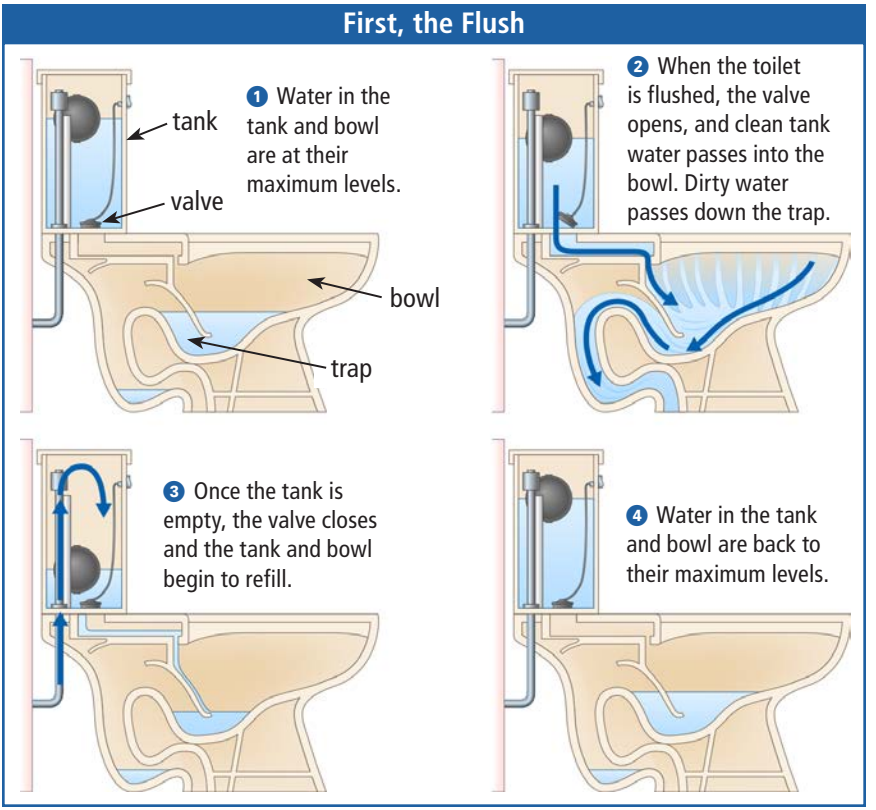
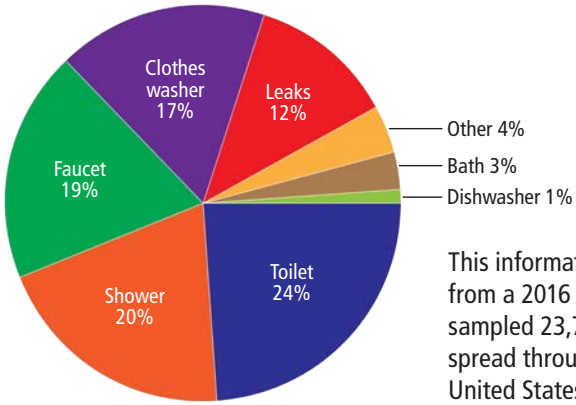
Introduction

SWOOSH! You hear this sound every time you flush a toilet. But did you ever stop to wonder where everything that you flush down winds up?

Getting rid of waste is often a complex **process**. That process can stretch over (or under) many miles in your city or town.



What Makes Up My Sewage?



This information comes from a 2016 survey that sampled 23,749 homes spread throughout the United States.

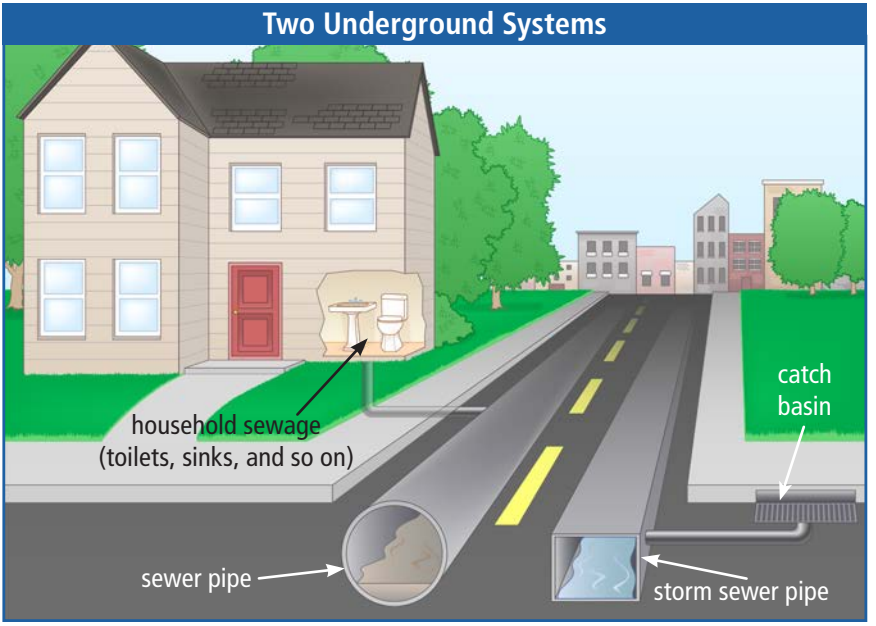
Where Does Waste Come From? Where Does It Go?

Human waste is called **sewage**. In most homes, it is created by using the toilet, sink, or anything that makes water dirty. If all this sewage reached our drinking water, it would make it unsafe.

For more than two billion people around the globe, waste either piles up on the land or runs into lakes and rivers. Millions of people die each year, sick from drinking water that sewage has made unsafe. Sewage treatment experts are working hard to solve this problem, but it is a huge task.

A boy drinks from a water pipe crossing an uncovered sewage canal.

Lucky for us, the **sewer** pipes in our homes don't just empty into our drinking water. Instead, in many cities and towns, all of this dirty water ends up in the local sewer.



Sewer pipes carry waste to the sewage treatment plant. Some storm sewer pipes carry rainwater to the plant as well. Others carry rain directly to creeks, ponds, and other waterways.

Some sewer pipes, like this one in Germany, are big enough to stand in.

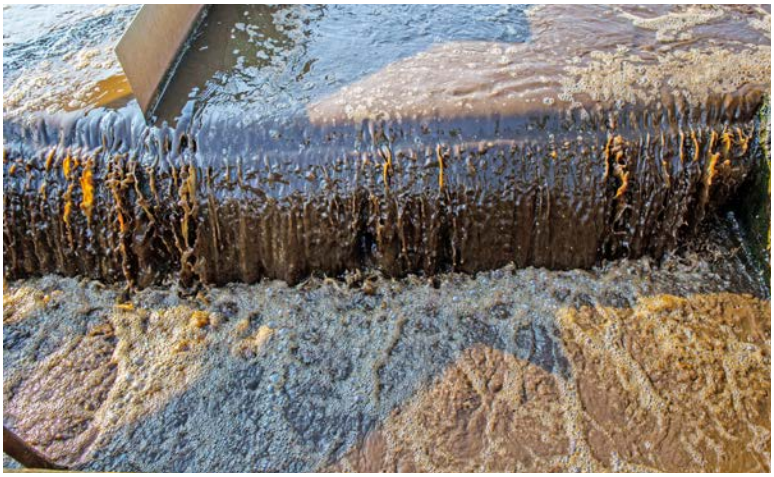
Inside the Treatment Plant

Small sewer pipes join up to form bigger and bigger pipes. The sewage moves through this large group of pipes to a **sewage treatment plant**. Here, the water is cleaned. Things in the water that can make people sick are removed.

Not all sewage treatment systems are alike. One common type cleans sewage in the following way:

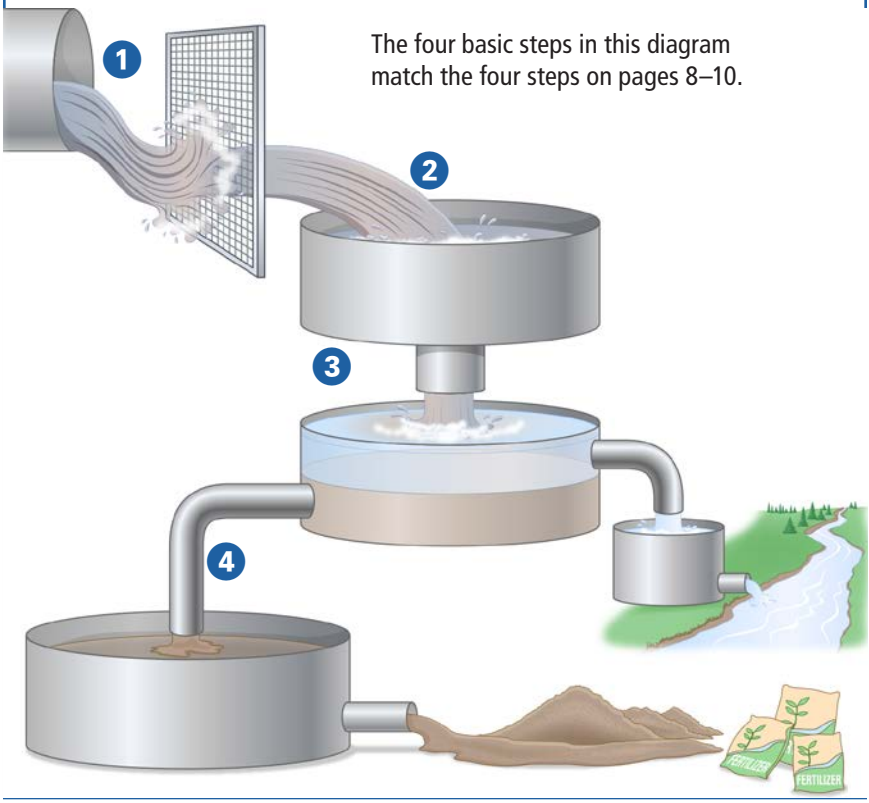
STEP ❶ A big screen (think of a giant kitchen strainer) removes large items such as rocks, sticks, and garbage. That way, they don't jam up the treatment plant's machines.

STEP ❷ What is left over after this process is called *sludge,* which is thick, dirty water. The treatment plant helps **bacteria** grow in the sludge. These bacteria eat the sludge to break it down.



Water moves into the clarifier tank (step #3) at a sewage treatment plant.

The Water Treatment Process



The tanks many city plants require are huge. San Francisco, California, has a water treatment plant that handles 60 million gallons (227 million L) a day and 250 million gallons (946 million L) on rainy days.

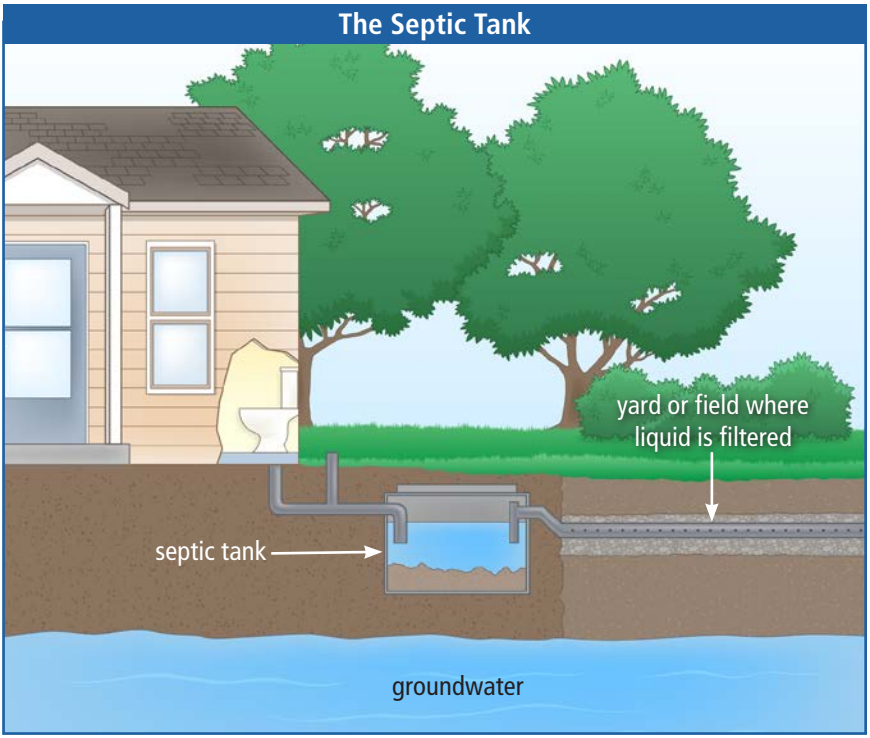
STEP 3 Next, the broken-down sludge is sent to another machine. Here, all of the solid waste settles to the bottom. The water at the top is sent to a **filter** that cleans it. Once it's safe, this water can be sent to a stream, lake, or the sea.

STEP 4 The solids are sent to a giant tank called a **digester**. Here, a second kind of bacteria eats much of the sludge.

The digester breaks down the solid sludge again and pulls more water from it. About half of the sludge turns into gas. Some of the gas helps power the plant's machines.

The other half of the sludge is dried. It's often used on farm fields to help grow crops.

Reclaimed water irrigates a golf course in the desert southwest. Reusing sewer water saves precious fresh water. A desert golf course can use the same amount of water in one day that a family of four does in five years.



A septic tank sends liquid to the soil, which filters it. Solids stay in the tank.

The Septic System—Another Way to Deal With Waste

Many homes in the country are far apart from each other. Building a system large enough to serve homes so far away from one another wouldn't make much sense. Instead, each home sends human waste into a **septic tank**. This is a small sewage treatment system that serves only one home.

The septic tank is buried underground in the yard near the home. Any waste from the home runs straight into the tank. Inside the tank, the solids drop to the bottom. The liquid runs out through underground pipes into the yard and spreads into the soil. The liquid is filtered as it moves through the soil, which pulls out harmful things before they reach drinking water.

Gurgling toilets and slow drains are signs that it's time to pump out your septic tank.

The septic tank collects all of the solid sludge, which builds up over time. When there is too much sludge in the tank, a septic business must pump it out.

Sewage Through the Ages

Think these systems are yucky? Think again. The first **sewerage systems** were built thousands of years ago in places such as ancient Greece and Rome. These early systems sent human waste with harmful bacteria away from cities—and directly into nearby water. The water made people sick.

An ancient sewer canal still remains in modern Greece.

Even by the 1800s, large cities like New York still had a hard time with their waste. People's homes had no toilets. Sometimes they just had a hole in the ground. Since there was no way to flush, human waste would pile up in the hole. Some people allowed their waste to spill over and wash into the streets. It would pile up where people walked and children played. The smell was awful.

Before modern plumbing, many people used outhouses like this one. Some outhouses had two stories. Others had two seats!

Men work in the New York City sewer around 1911.

Experts began to understand that streets flowing with waste were also making people sick. New York City began building sewerage systems so the waste would have somewhere to go. By 1914, it had nearly 850 miles (1,368 km) of sewer lines.

Today in the United States, waste disappears down toilets and sinks as if by magic. Now you know how it really works, though. So the next time you flush, take a moment to thank your modern sewerage system!

Glossary

bacteria *(n.)* small one-celled organisms that sometimes cause disease (p. 8)

digester *(n.)* a large tank in a sewage treatment plant where microorganisms break down solid waste (p. 10)

filter *(n.)* a porous material that is used to remove something unwanted from a liquid or gas that is passed through it (p. 9)

process *(n.)* a series of actions that may be natural or that are designed as steps to a goal (p. 4)

septic tank *(n.)* an underground container in which sewage is collected (p. 11)

sewage *(n.)* human waste that is carried away from buildings through a system of pipes (p. 5)

sewage treatment plant *(n.)* a place where sewage is cleaned and processed to make it safe for the environment (p. 7)

sewer *(n.)* one or more pipes that carry off water and sewage (p. 6)

sewerage systems *(n.)* drains and pipes that carry away sewage (p. 13)

Words to Know

bacteria
digester
filter
process
septic tank
sewage
sewage treatment plant
sewer
sewerage systems

Page 3: This pond at a sewage treatment plant helps bacteria grow. The bacteria in turn break down the sewage.

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Connections

Writing and Art

Draw a diagram of the route sewage takes after a toilet is flushed. Label your diagram and write a step-by-step explanation of the process.

Social Studies

Write a paragraph describing how modern sewerage systems have solved sewage problems of the past. Discuss your ideas with a partner.