

NATURE'S WAY

HOW WASTEWATER TREATMENT WORKS FOR YOU



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Twenty thousand feet above the surface of the earth, water molecules change from vapor to liquid in a storm cloud building over a range of mountains. The water falls to earth as rain and flows down through mountain streams to a large reservoir which serves as the source of drinking water for a city. Ultimately, it flows through the water supply system and into a home where a teenage boy uses it to brush his teeth on a Saturday morning.

At this point the water begins its return trip to nature. It drains from the bathroom sink into the community's sanitary sewer system which leads to the public treatment plant. Here it is joined by millions of gallons of wastewater coming from other homes, businesses, industries, and institutions, and is treated by a variety of processes to remove pollutants.

After treatment, the cleansed wastewater is released to a lake, stream, or river, where it flows toward one of the great oceans. It will be used again by other people along the way for irrigation, by industry, as drinking water, or it will evaporate into the atmosphere and return again as rain in some other part of the world. This example illustrates two important points:

1. Water is a finite resource; we have all that we will ever get. It is used over and over again, and its cleanness must be protected.
2. Your public wastewater treatment plant stands at a critical point in this water cycle. It helps nature's way of cleaning water and is a last defense against the polluting of our water supplies.

HOW WE'RE DOING

When you visit a wastewater treatment plant, take a look at the laboratory. Here, technicians conduct regular tests to monitor the wastewater entering the plant in order to detect changes and to assure that the plant is meeting its requirements for producing clean water. Samples are usually taken on an hourly and daily basis, and results are reported to governmental agencies.

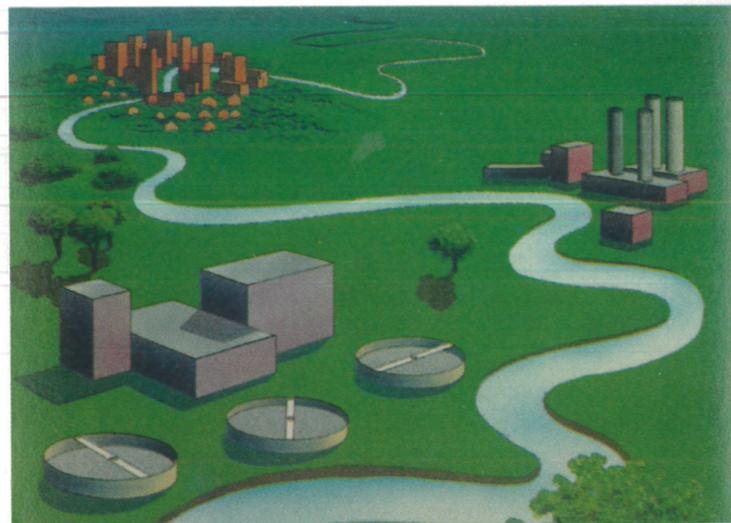
At some plants, computers help operate the equipment, gather and store data, and prepare reports.

A MANAGEMENT TEAM

There are no holidays for wastewater treatment. Most plants operate 24 hours a day every day. To meet clean water standards on a continuous basis, a wastewater treatment plant needs to be well managed and skillfully operated.

A successful plant manager is trained in planning and budgeting, personnel, communications, supervisory skills, and governmental procedures. Superintendents and operators are certified in mechanics, chemistry, hydraulics, biology, and computer operation.

The modern wastewater treatment plant also needs well-conceived programs for maintenance and repair of equipment, upgrading of operator skills, safety, energy conservation, and process efficiency.



WASTEWATER COLLECTION AND TREATMENT

Treatment of wastewater is a relatively modern practice. While sewers to remove foul-smelling water were common in ancient Rome, it was not until the 19th century that large cities began to understand that they had to reduce the amount of pollutants in the used water they were discharging to the environment.

Despite large supplies of fresh water and the natural ability of water to cleanse itself over time, populations had become so concentrated by 1850 that outbreaks of life-threatening diseases were traced to bacteria in the polluted water.

Since that time, the practice of wastewater collection and treatment has been developed and perfected, using some of the most technically sound biological, physical, chemical, and mechanical techniques available. As a result, public health and water quality are protected better today than ever before.

The modern sewer system is an engineering marvel. Homes, businesses, industries, and institutions throughout the modern world are connected to a network of below-ground pipes which transport wastewater to treatment plants before it is released to the environment. Wastewater is the flow of used water from a community. As the name implies, it is mostly water; a very small portion is waste material.

At a typical wastewater plant, several million gallons of wastewater flow through each day—50 to 100 gallons for every person using the system. The amount of wastewater handled by the treatment plant varies with the time of day and with the season of the year. In some areas, particularly communities without separate sewer systems for wastewater and runoff from rainfall, flow during particularly heavy rains or snowmelts can be much higher than normal.

What happens in a wastewater treatment plant is essentially the same as what occurs naturally in a lake or stream. The function of a wastewater treatment plant is to speed up the process by which water cleanses (purifies) itself.

A treatment plant uses a series of treatment stages to clean up the water so that it may be safely released into a lake, river or stream. Treatment usually consists of two major steps, primary and secondary, along with a process to dispose of solids (sludge) removed during the two steps.

PRIMARY TREATMENT

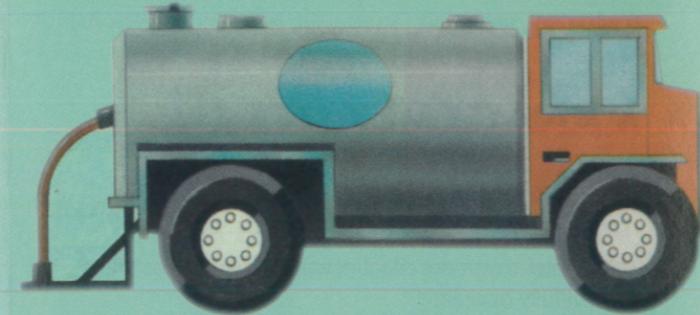
In primary treatment, sand, grit and the larger solids in the wastewater are separated from the liquid. Screens, settling tanks, and skimming devices are most commonly used for the separation. Primary treatment removes 45 to 50 percent of the pollutants.

SECONDARY TREATMENT

After primary treatment, wastewater still contains solid materials either floating on the surface, dissolved in the water, or both. Under natural conditions, these substances would provide food for such organisms as fungi, algae, and bacteria that live in a stream or lake.

Most public wastewater treatment plants now provide a second stage of treatment known as secondary treatment to remove more of the pollutants — up to 85 or 90 percent altogether.

Secondary treatment is largely a biological process. Air is supplied to stimulate the growth of bacteria and other organisms to consume most of the waste materials. The wastewater is then separated from the organisms and solids, disinfected to kill any remaining harmful bacteria, and released to a nearby lake, river, or stream.



THE STUFF THAT'S LEFT BEHIND

You may have figured out by now that while treatment of wastewater solves one problem — cleaning the water that is released from the treatment plant to the stream — it can generate others.

For example, the material that is removed from wastewater doesn't just disappear. It is called sludge. Sludge requires proper treatment and disposal, and can often be reused.

Sludge handling methods are designed to destroy harmful organisms and remove water. The end product of the sludge handling process is a relatively dry material known as "cake." It can be applied to agricultural land as a soil conditioner, placed in landfills, or cleanly burned.

At some plants, sludge serves as a fuel to produce energy.



YOUR ROLE

While wastewater treatment has been practiced by civilized society for over 100 years, it has been only since the 1970s that national standards for clean water have been set and billions of dollars committed for the construction of treatment plants. And even though we depend on clean water every day of our lives, the overwhelming public demand for clean lakes and rivers and safe drinking water is a fairly recent development.

This is where you come in. Your support for efficient wastewater treatment in your community is extremely important. Learn as much as you can about your wastewater treatment plant and share that information with your family and friends. Clean water is for everyone.

This brochure has covered wastewater treatment in general terms; the plant in your community may use different processes, tailored to local conditions and requirements.

A companion piece to **NATURE'S WAY** is now available. **HOUSEHOLD HAZARDOUS WASTE: WHAT YOU SHOULD AND SHOULDN'T DO** offers practical advice on the safe disposal of hazardous and toxic materials often found in the home. This brochure can help you increase public awareness of the individual's role in creating and solving the problems of water pollution.

For further information contact your local waste-