How Water Works

ILLUSTRATED PROCESSES, EQUIPMENT, AND TECHNOLOGY

Wastewater Treatment Protects the Environment

Every community produces liquid and solid wastes. The liquid portion—wastewater—is the water supply of the community after it has been used for a variety of purposes. Miles of pipe connect homes and businesses to the wastewater treatment plant to remove physical, chemical, and biological contaminants. The plant's objective is to produce a waste stream (or treated effluent) and solid waste (or sludge) suitable for discharge or for reuse back in the environment.

1. At the headworks, wastewater passes through screens to remove solid debris and floating material, such as rags, paper, plastics, and metals, that could cause problems later in the treatment process. Most of the removed materials are sent to a landfill.

2. Grit removal facilities eliminate sand, gravel, and other solid materials that are heavier than the organic biodegradable solids in the wastewater.

3. Motor control centers supply power to pumps required to move the wastewater to primary treatment. From here, gravity takes over to move the wastewater through the treatment process.

4. At the blower building, air is provided to the microorganisms in the aerobic treatment basins (7).

5. Primary settling tanks reduce the flow velocity and allow suspended material to settle to the bottom. Revolving "arms" simultaneously scrape the primary (untreated) solids from the bottom and skim the grease from the top. The solids receive further treatment as sludge.

6. Digesters process the sludge. Within the heated tanks, microscopic bacteria digest the sludge and break it down into stable organic matter, which can be reused in agricultural applications or in landfills.

7. Secondary effluent flows into aerobic treatment basins where bacteria break down contaminants even further.

8. Chlorination tanks kill disease-causing organisms before the water is released back into the environment. Dechlorination is generally necessary before the water is released.

9. The final effluent may be discharged to a stream, river, bay, lagoon, or wetland, or it can be used for irrigating a golf course, greenway, or park. If it's sufficiently clean, it can also be used for groundwater recharge.

Some illustration elements exaggerated for emphasis.

ILLUSTRATION: RON KNOWLTON

www.awwa.org/communications/opflow
2007 © American Water Works Association