



*presented by:*

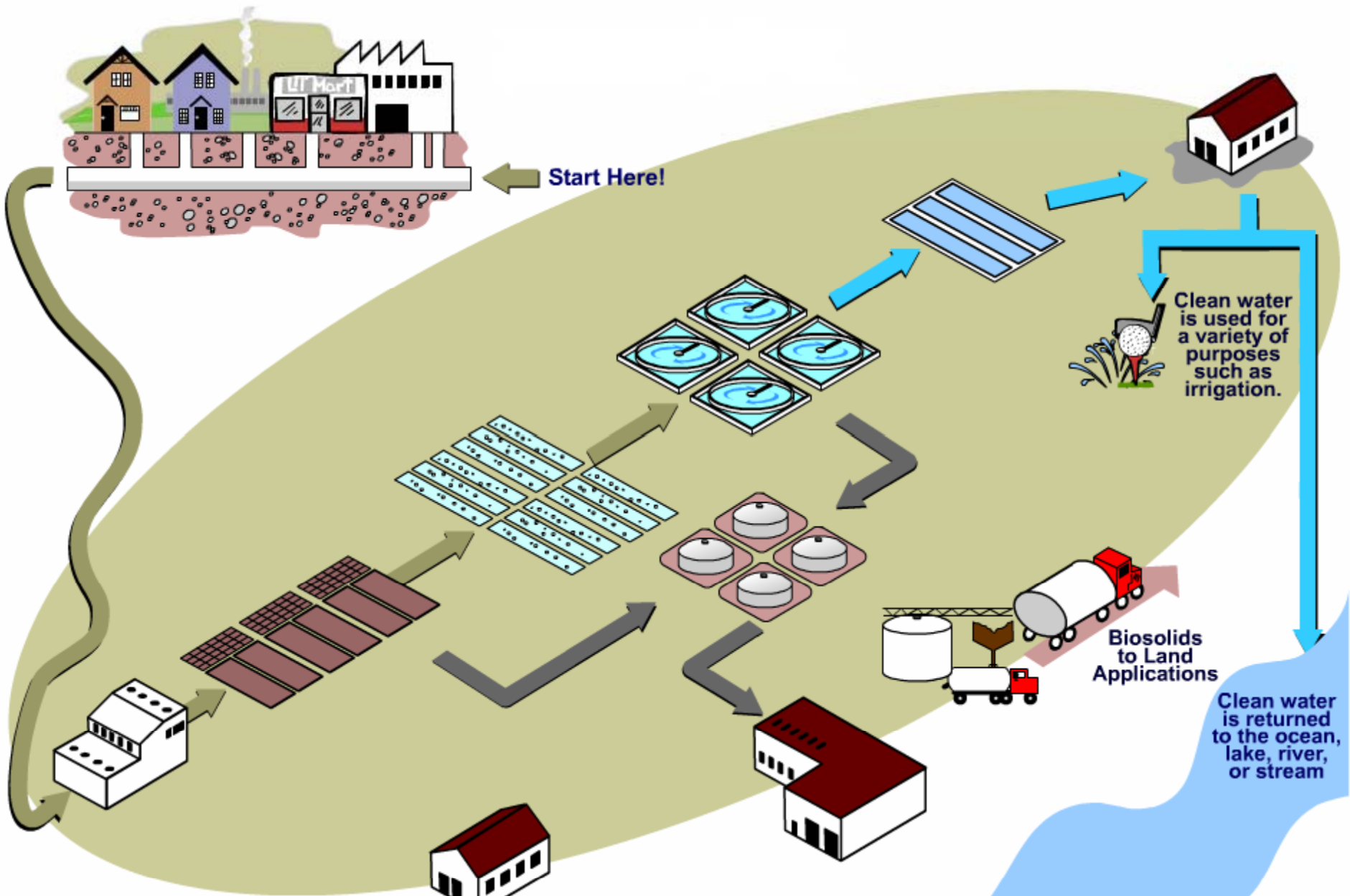




*Note: Only click on selected arrow to switch slides*

*English - Start here* ➔

*Español - Comience aquí* ➔



Start Here!

Clean water is used for a variety of purposes such as irrigation.

Biosolids to Land Applications

Clean water is returned to the ocean, lake, river, or stream

Laboratory

**Water Environment Federation**<sup>®</sup>  
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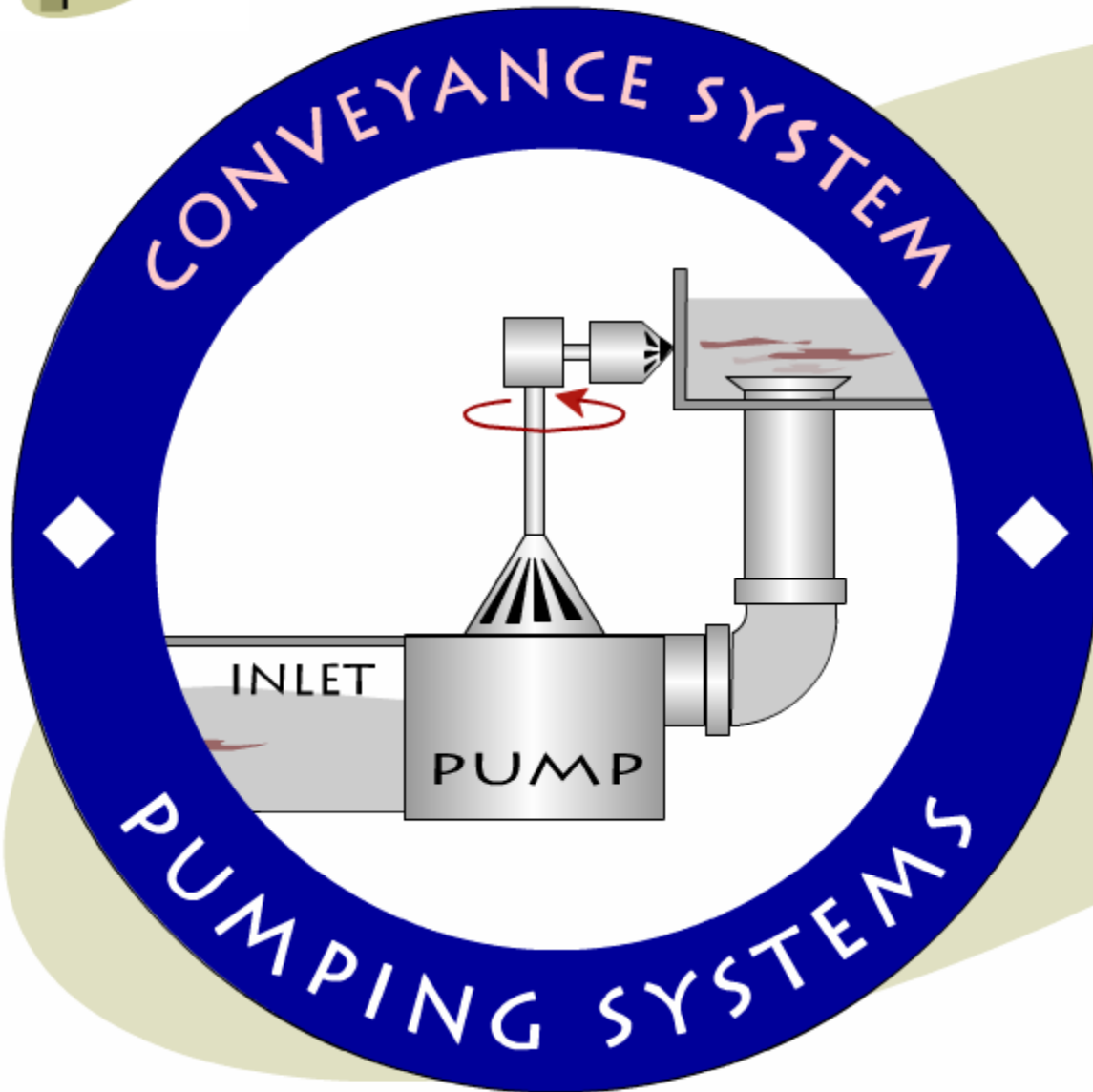
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On average, each person in the United States contributes approximately 150 gallons of water per day (about 5 shower tubs full) to a community's wastewater flow. Each house or business has a pipe that is connected to a network of underground pipes and pump stations, which carries the wastewater to a treatment facility. Wastewater is then processed to remove pollutants and is disinfected before it is discharged to the ocean, a river, stream, or lake.

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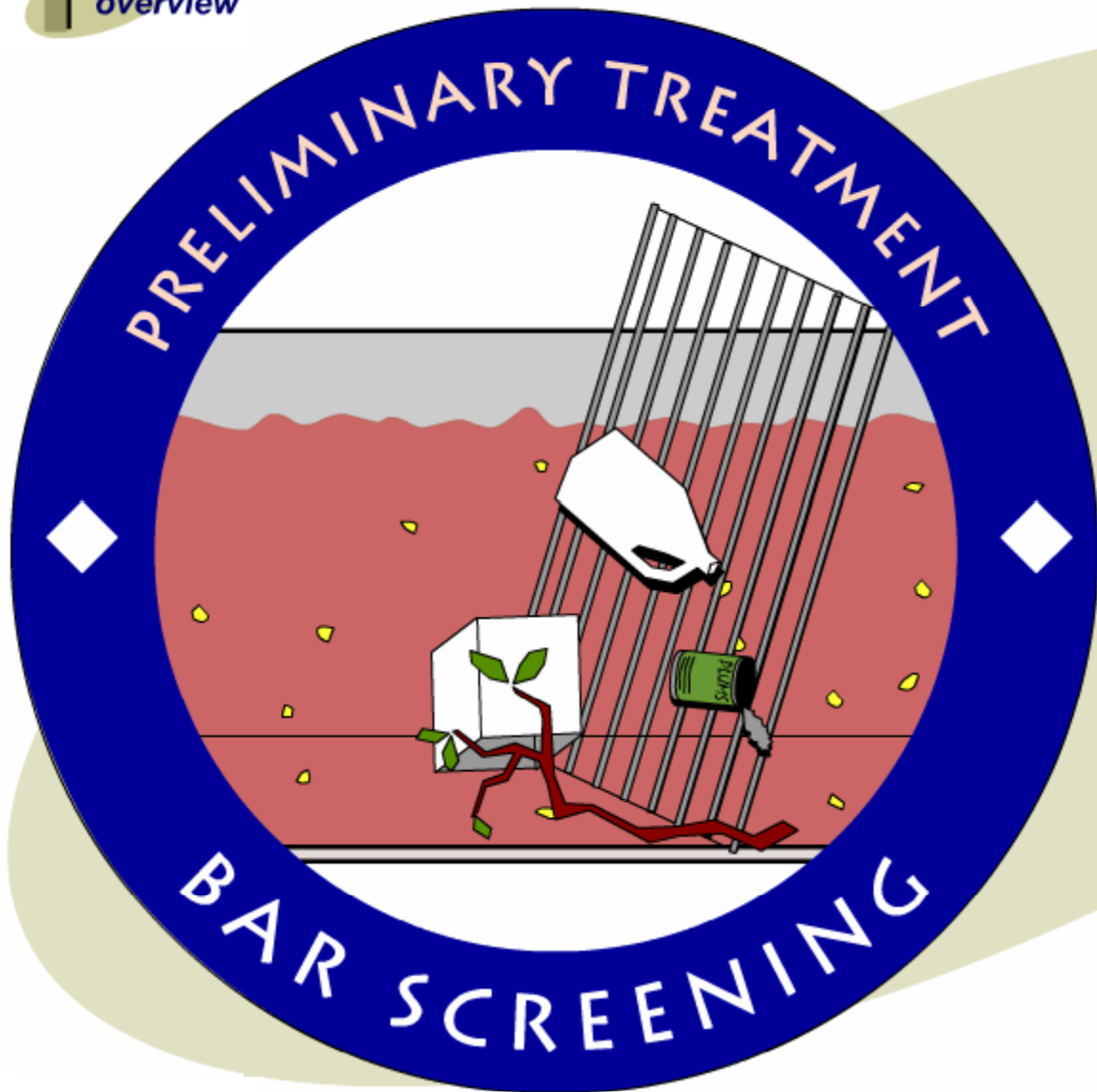


Most sanitary sewers move the wastewater downhill by gravity to the wastewater treatment facility. In some situations, special pumps are needed to force the wastewater uphill into the facility. Because wastewater contains material such as rocks, sand, paper, etc., these pumps must be able to handle many different conditions.

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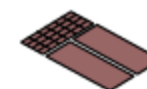

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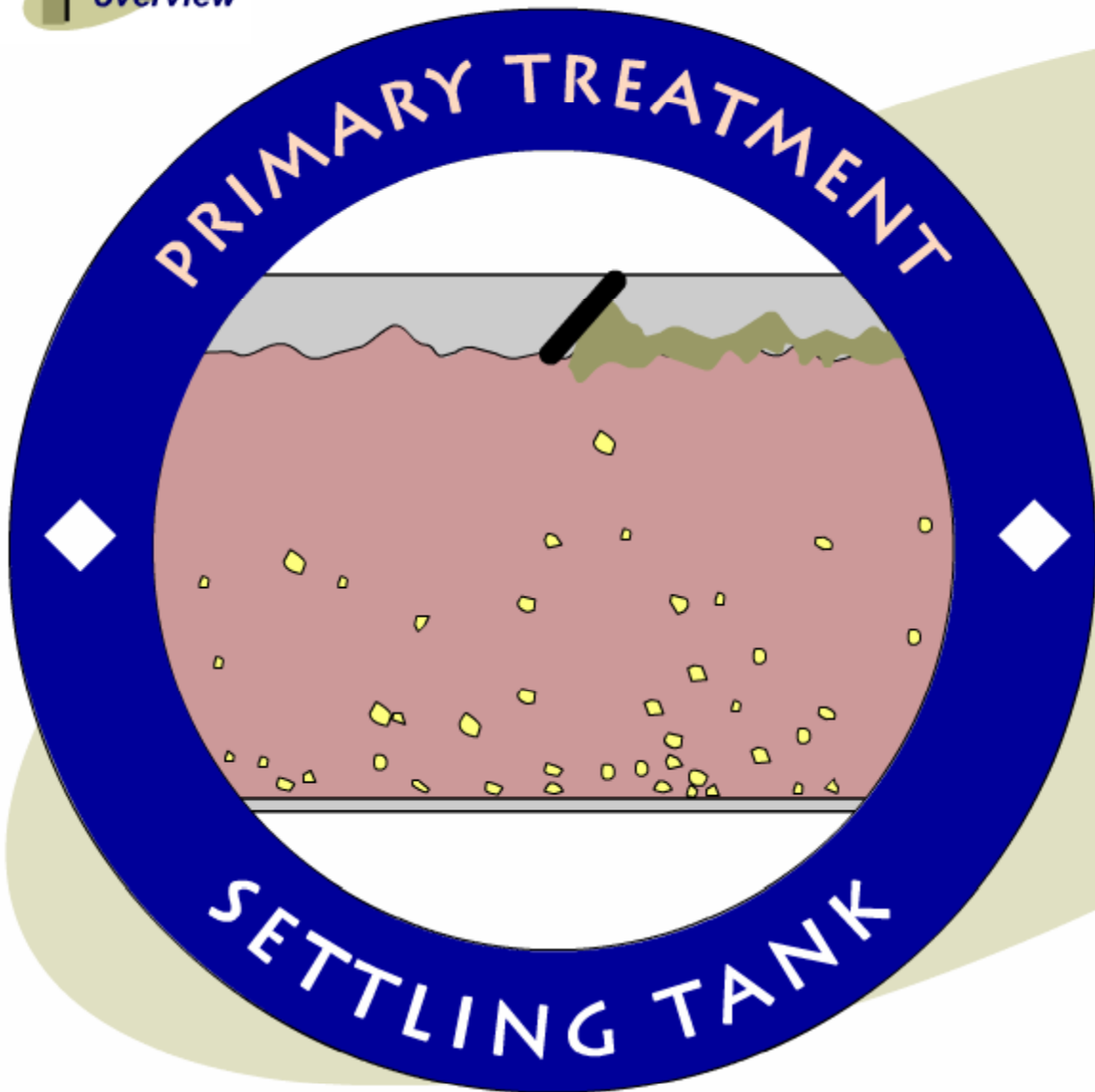


A bar screen (a large metal rack with bars placed every few inches) is located at the beginning of a wastewater treatment plant to remove large trash, sticks, plastic materials, rags, etc. It is important to remove these materials because they could cause damage to the plant equipment. The captured material is then removed and properly disposed by the plant attendants.

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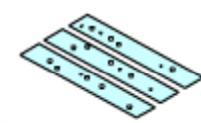
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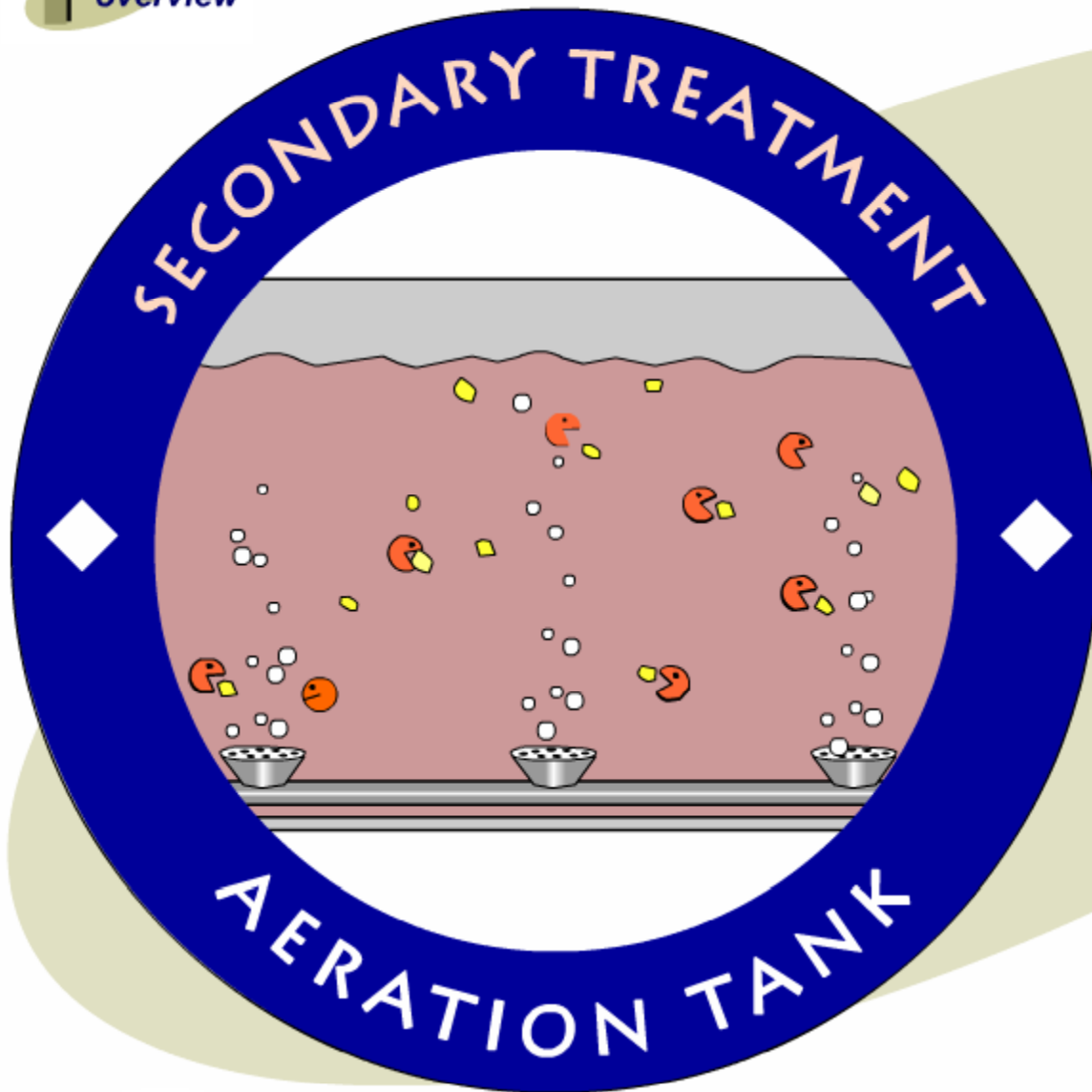
Primary settling tanks provide an efficient process for the removal of solids that are heavy and sink to the bottom as well as materials that float to the surface such as oil and grease. Settling tanks are designed to hold the wastewater for several hours. During that time, most of the heavy solids fall to the bottom of the tank, where they become a thick slurry known as primary sludge. The material that floats is also skimmed from the surface of the tanks. Both the primary sludge and skimmed material are typically pumped to a solids treatment process.

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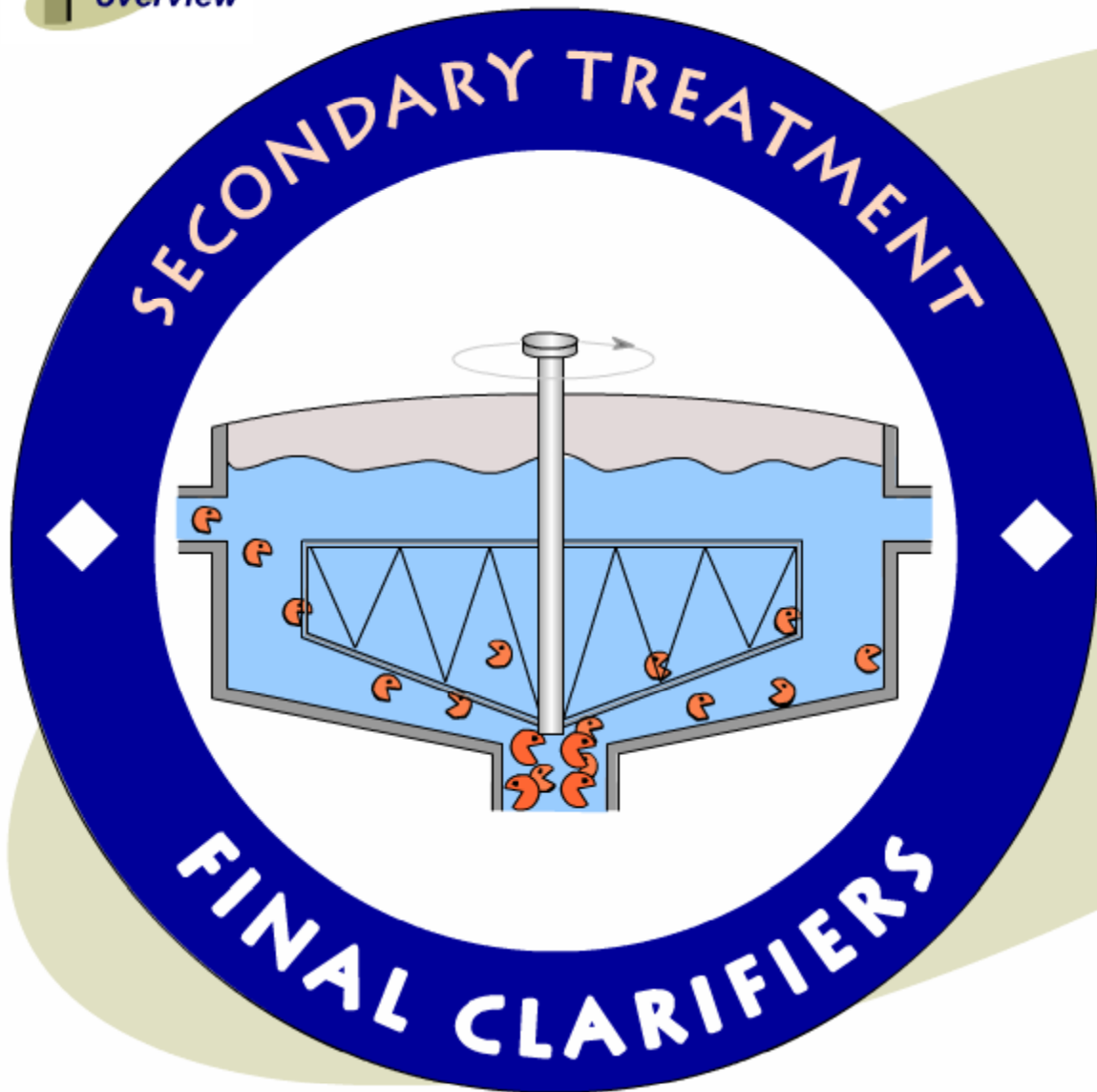
Wastewater flowing out of the settling tanks still contains some solids and dissolved materials. A secondary treatment process such as activated sludge is used to create a natural environment where microorganisms, such as bacteria and protozoa, use the remaining organic material and nutrients in the wastewater as their food supply. Aeration tanks are used to contain the microorganisms in an environment that is best for them. One type of aeration tank uses air bubbles to provide the mixing and oxygen that are needed by the microorganisms.

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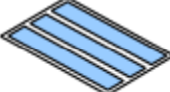


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The microorganisms that grow in the aeration tank will eventually fall to the bottom. In the activated sludge process, most of them are recycled back to the aeration basin where they continue to remove organics and nutrients from the wastewater. Excess microorganisms that grow in the system are removed from the activated sludge process, and are typically pumped to a solids treatment process.

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The final treatment process in most plants is disinfection. Chlorine frequently is the disinfectant of choice, although there are other chemicals and techniques that are added to the water to kill disease-causing bacteria and virus. The treated effluent water is held in tanks to allow sufficient time for disinfection to occur. Following disinfection, the treated wastewater can be returned to the ocean, a river, stream, or lake.

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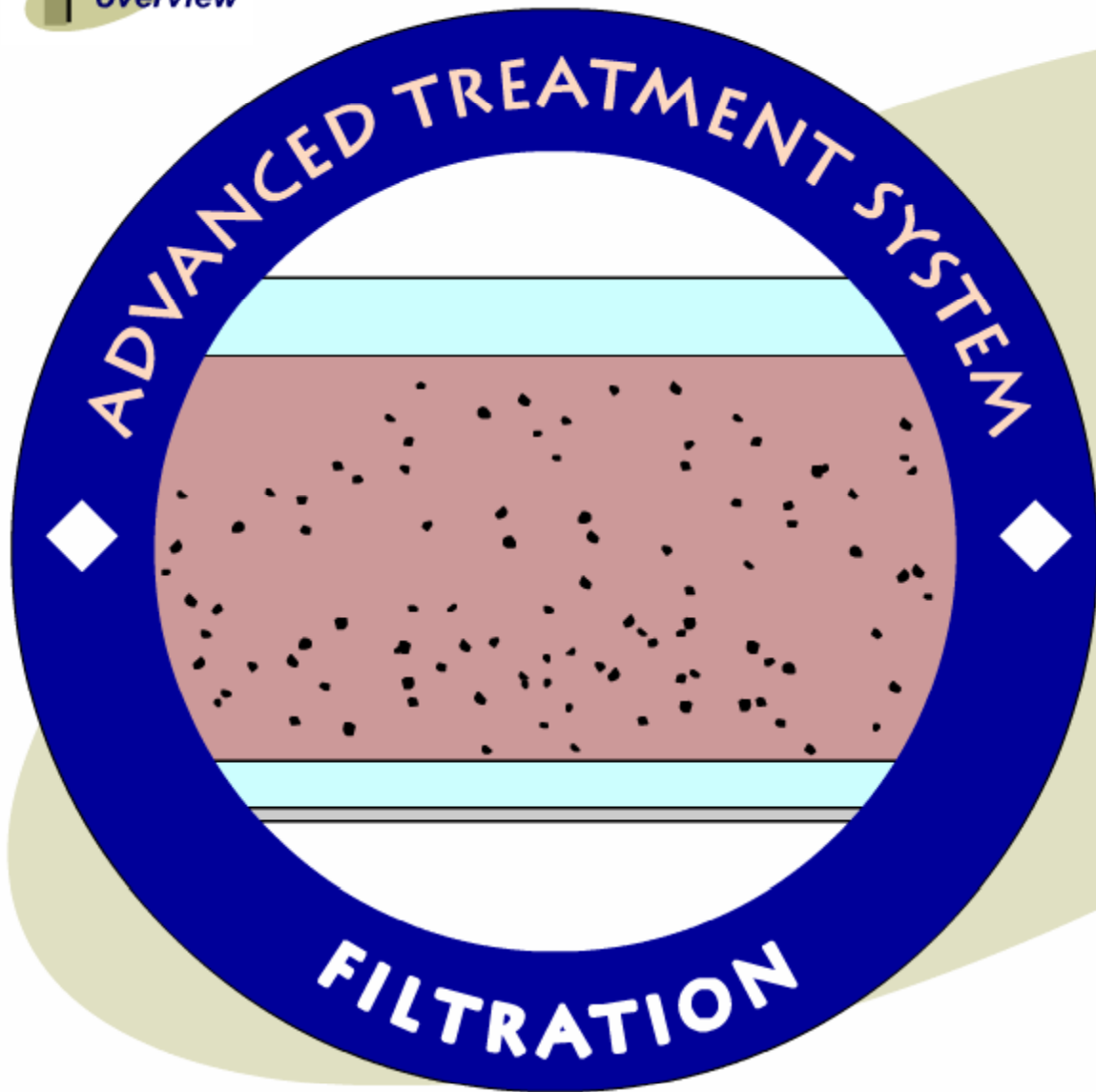


In some plants, ultraviolet light is used for disinfection instead of chlorine. The water passes through chambers containing ultraviolet lamps, and the resulting exposure to high levels of ultraviolet light kills disease-causing bacteria and virus.

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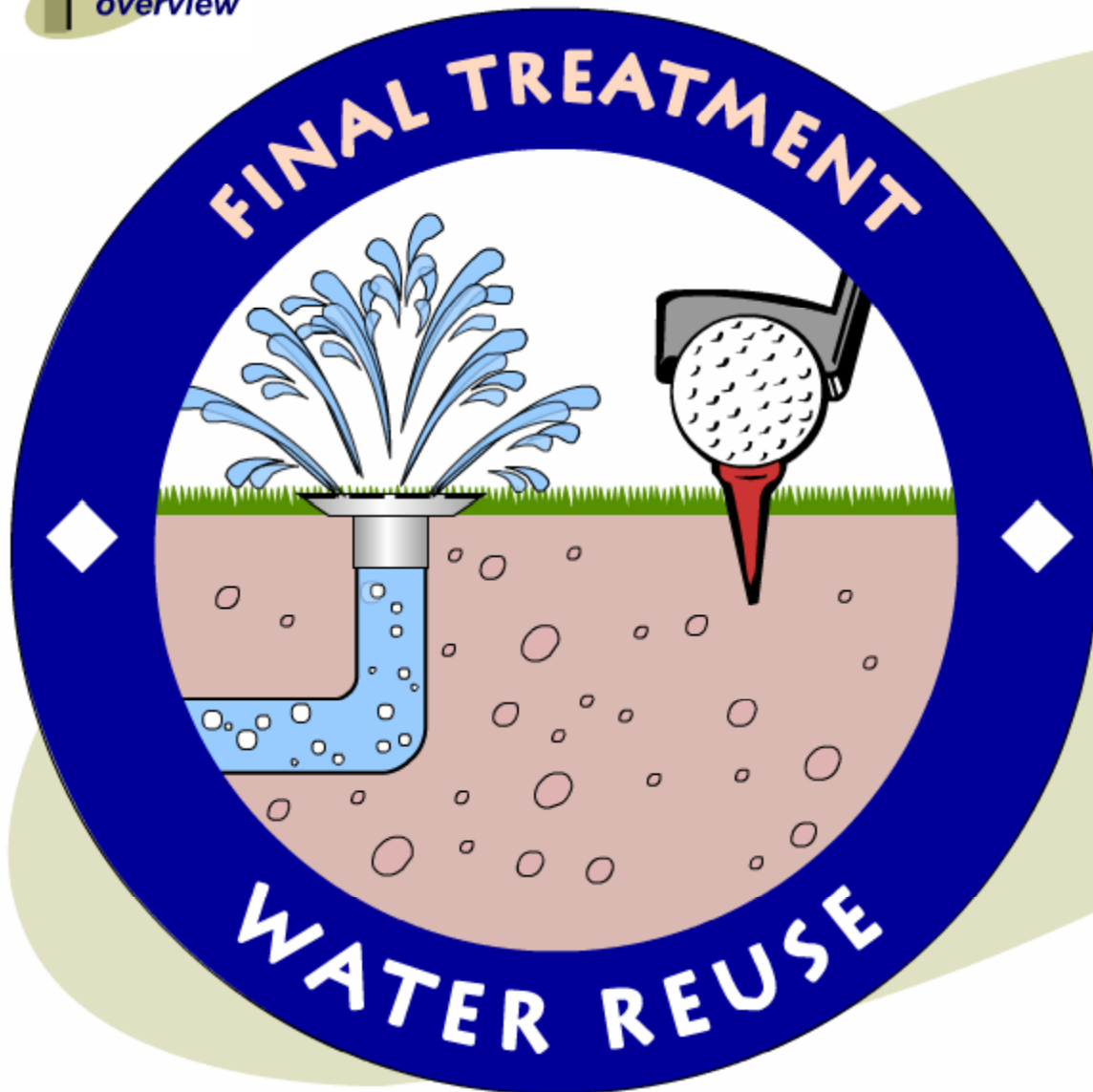


In situations where a higher degree of treatment is required, such as when the treated water is used for irrigation of golf courses and parks, the secondary effluent is filtered through sand and crushed coal to remove small solid particles. As the filters become clogged with material, they are cleaned (backwashed), and the collected solids are reprocessed in the plant.

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Clean water is returned to the ocean, lake, river or stream.

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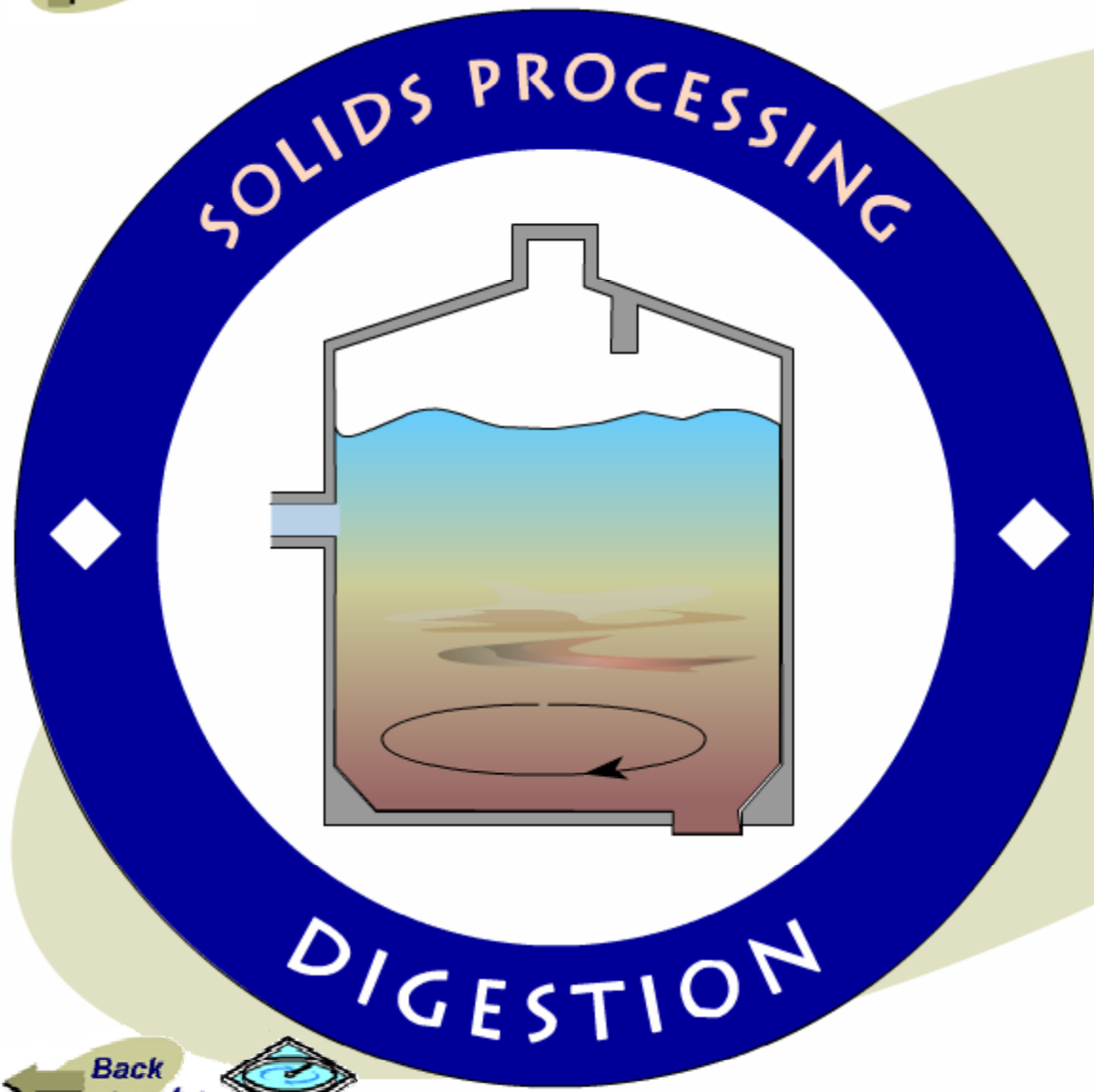
Treated wastewater can also be reused for industrial processes, for irrigation of crops, and for landscape irrigation, such as on golf courses. Water that is used for irrigation of parks and golf courses has typically been treated with advanced treatment processes, such as filtration. Reclaimed water that is used for irrigation can provide valuable nutrients, such as nitrogen and phosphorus, to the crops being grown.

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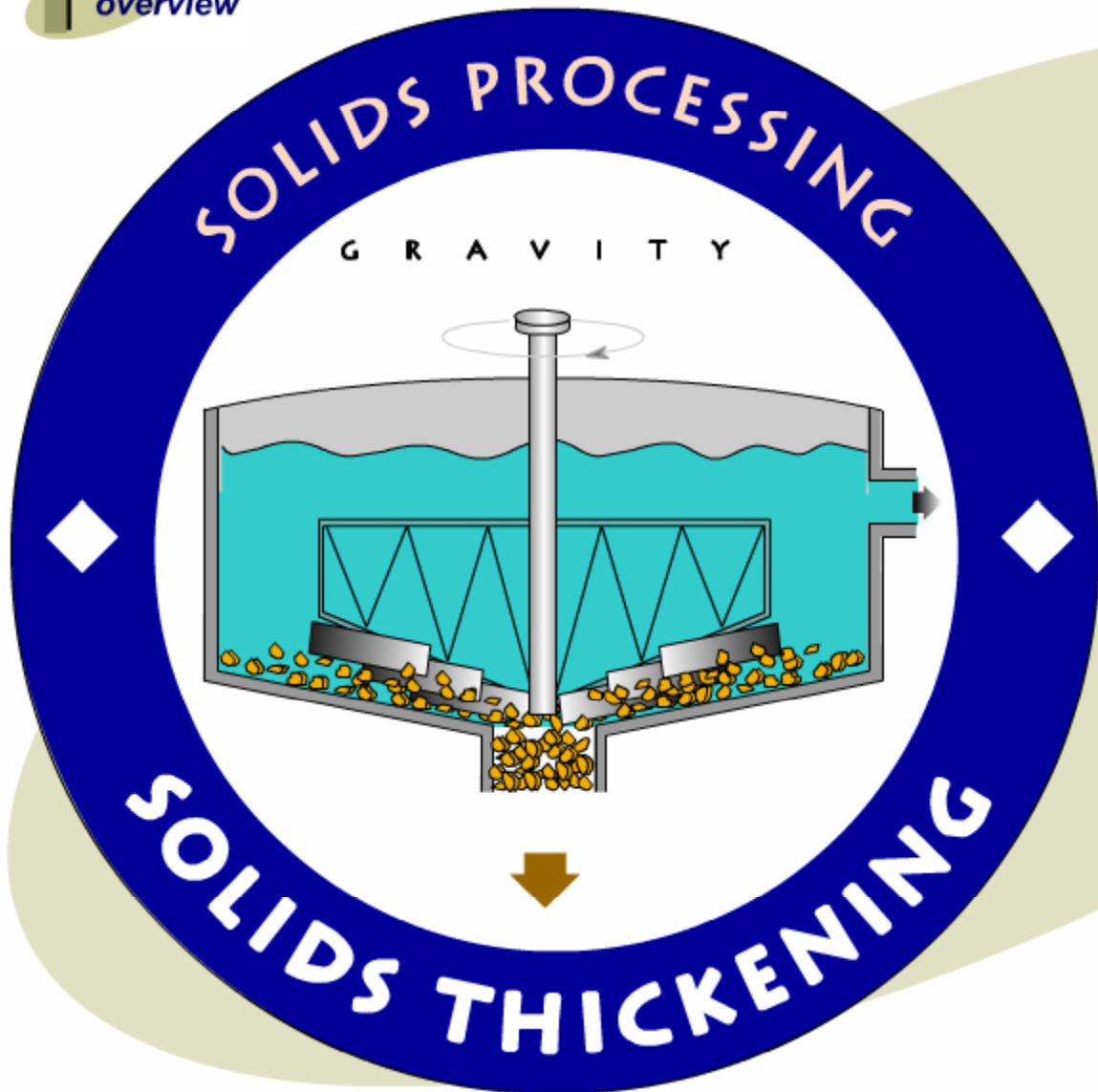
The main solids treatment process in a plant is typically anaerobic digestion. During this process, large tanks are used to mix and heat the solids. Microorganisms present in the solids use the organic material as a food source and convert it to byproducts such as methane gas. This gas is often used as an energy source in the plant. Digestion results in stabilized biosolids that can be recycled for beneficial uses such as conditioning and fertilizing agricultural land.

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The concentrated solids that are produced in a plant contain some solids and mostly water. It is estimated that only 0.3% of a treatment plant influent is solid matter. After secondary treatment, the solids may contain 90 to 95% water. Settling tanks are used to further concentrate the solids before they are pumped to a digestion process.

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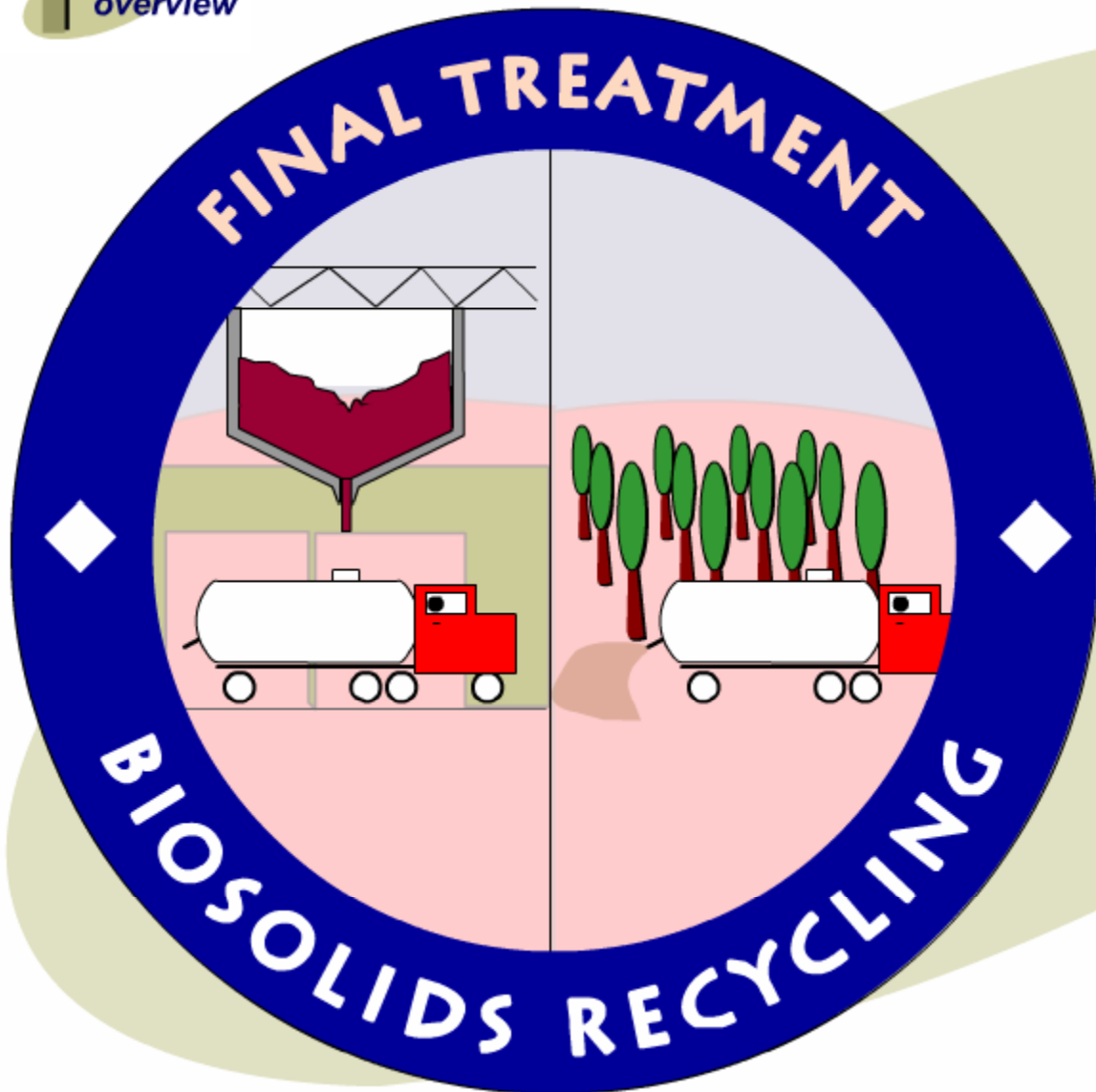
Following the digestion process, the biosolids still contain a significant amount of water. Mechanical equipment such as filter presses and centrifuges (like a huge blender) are used to squeeze water from the biosolids and reduce the volume that must be transported to other locations.

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The sludge produced in a wastewater treatment plant is converted to "biosolids" through various treatment processes. When applied to land, the biosolids provide valuable nutrients that can improve the condition of soils and yield better crops. Wastewater treatment plants that recycle biosolids must meet stringent regulatory requirements to assure the safe reuse of this material.

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