Chapter 3: Wastewater Treatment Facilities

King County
DNRP/WTD

Sacramento State
Redefine the Possible

(Revision 1, JAN 2019)

Words

BOD

Biochemical Oxygen Demand (BOD, also called Biological Oxygen Demand) is the amount of dissolved oxygen needed (i.e. demanded) by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period.

Continued…

Words

BOD (continued)

The BOD value is most commonly expressed in milligrams of oxygen consumed per liter of sample during 5 days of incubation at 20°C, and is often used as a surrogate of the degree of organic pollution of water.

Words

BIOCHEMICAL OXYGEN DEMAND (BOD)

- BOD INDICATES HOW MUCH DECAYING ORGANIC MATTER IS PRESENT. MORE ORGANIC WASTE, MORE OXYGEN DEMANDING BACTERIA.
- DISSOLVED OXYGEN MEASURES THE AMOUNT OF OXYGEN AVAILABLE. HIGHER BOD MEANS LOWER DISSOLVED OXYGEN.
- ORGANIC WASTE SUCH AS SEWAGE AND FOOD WASTE IS HIGH IN NITRATES AND PHOSPHATES WITH LEADS TO AN INCREASE IN OXYGEN-DEMANDING BACTERIA.
- THIS BACTERIA STRIPS THE ECOSYSTEM OF OXYGEN FOR THE LARGER ORGANISMS.

BOD Level *(in ppm)*	Water Quality
1 - 2	**Very Good** There will not be much organic waste present in the water supply.
3 - 5	**Fair: Moderately Clean**
6 - 9	**Poor: Somewhat Polluted** Usually indicates organic matter is present and bacteria are decomposing this waste.
100 or greater	**Very Poor: Very Polluted** Contains organic waste.

Words

DETENTION TIME

The theoretical time required for a given flow of wastewater to pass through a tank.

$$\textbf{Detention time, } hrs = \frac{(\text{Volume, } gal)(24\ hrs/day)}{\text{Flow, } gpd}$$

Words


I WILL NOT CREATE ART
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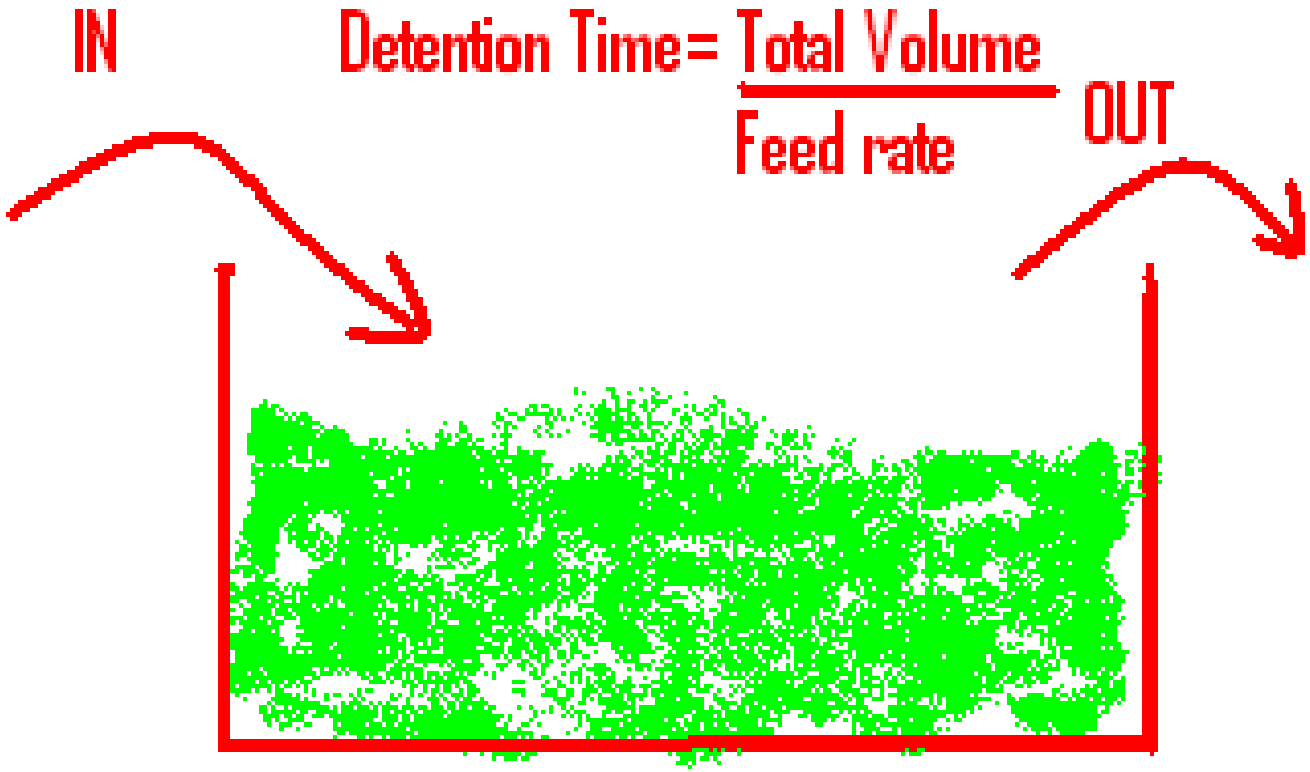
Words



Words

SHORT-CIRCUITING

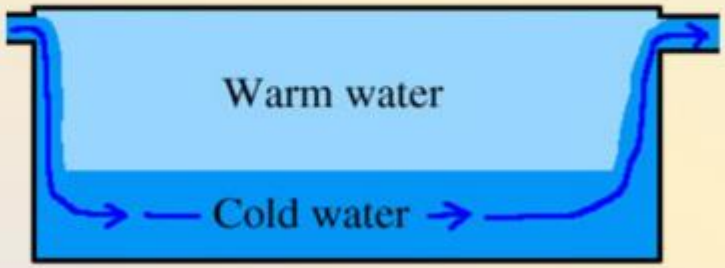
A condition that occurs in tanks or basins when some of the flowing water flows along a nearly direct pathway from the inlet to the outlet of the tank.

Words

Clarifier Short Circuiting

Causes

Temperature stratification between influent & clarifier water temperatures.



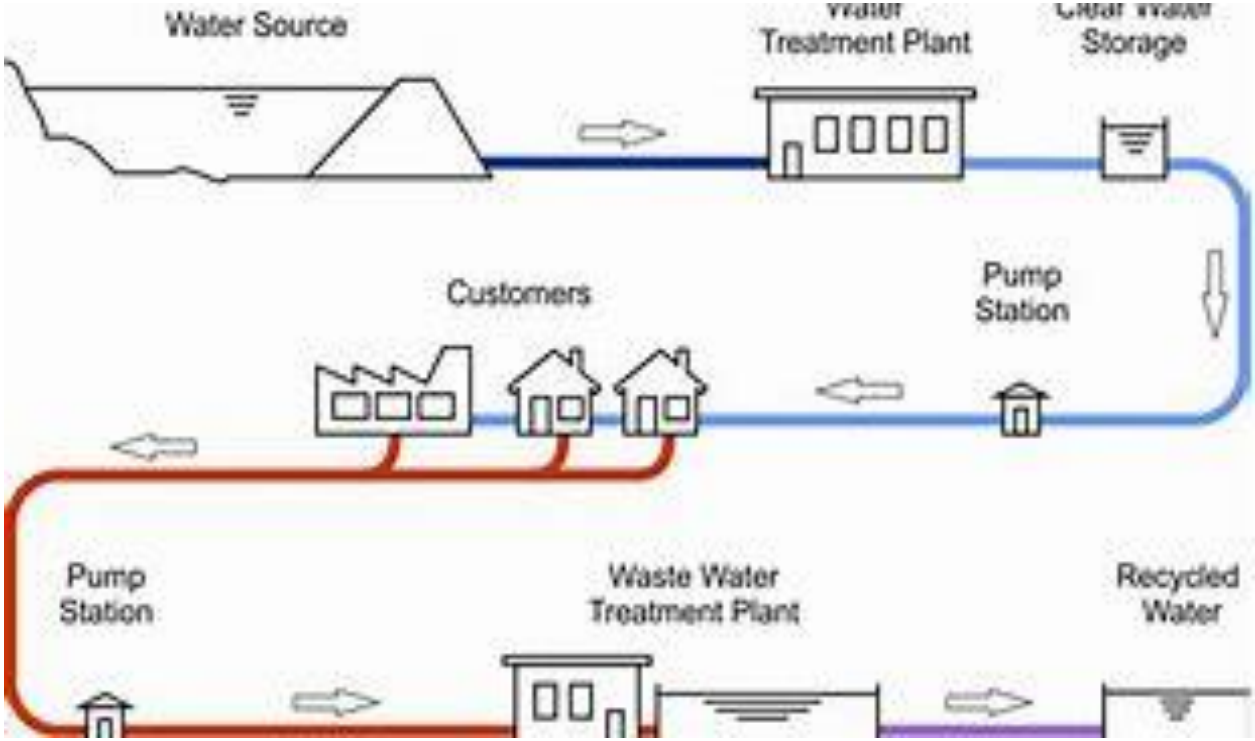
Words

SUPERNATANT

Liquid removed from settled sludge.

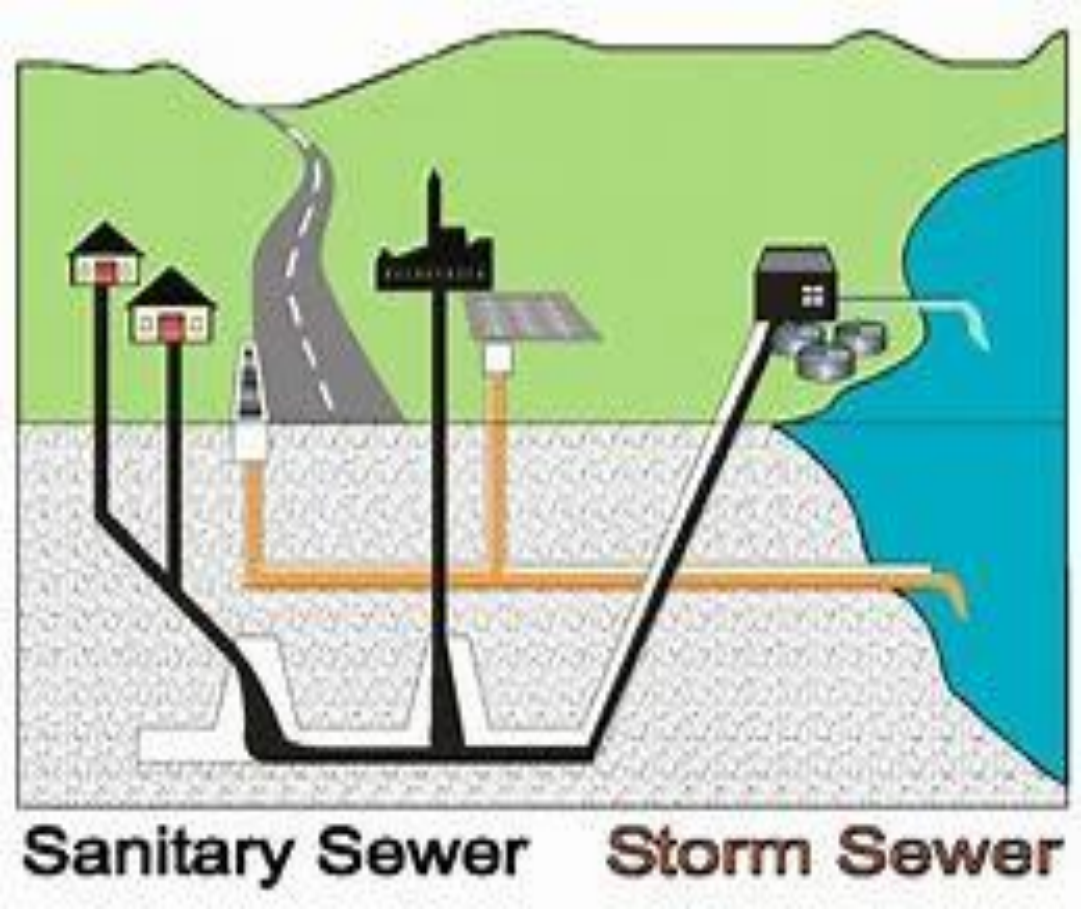
Process Description

COLLECTION



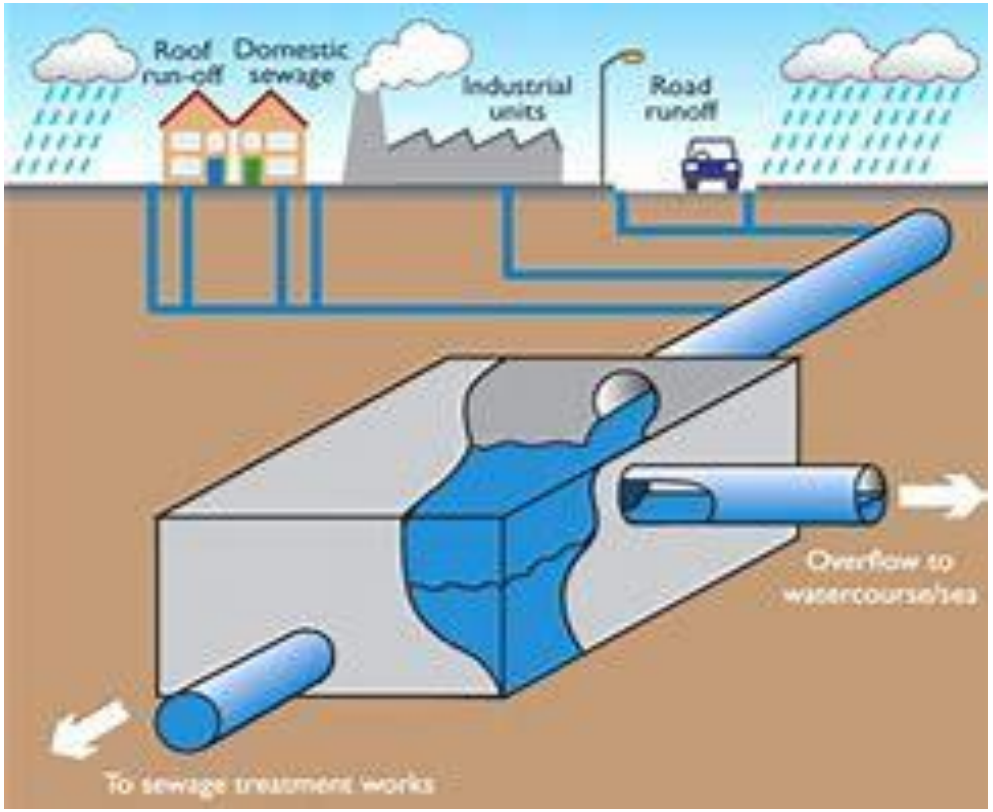
Process Description

SANITARY SEWER
STORM SEWER



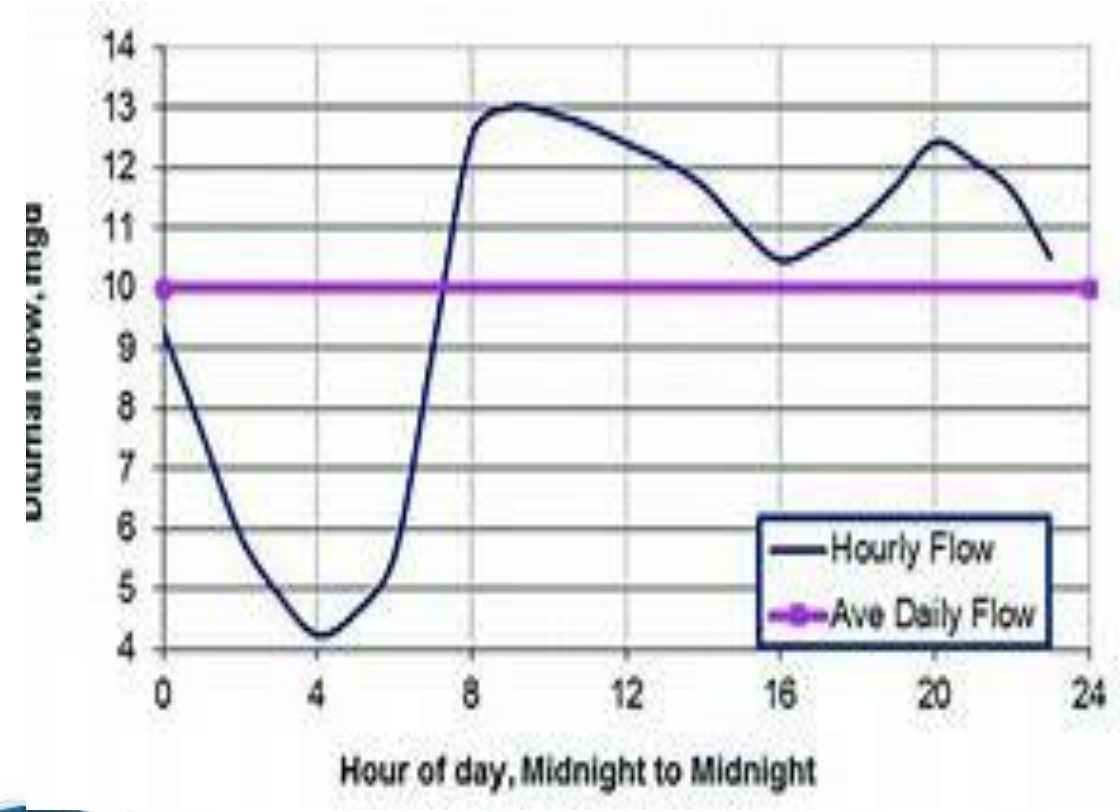
Process Description

COMBINED SEWER



Process Description

RESIDENTIAL
Diurnal Flows



Process Description

COMMERCIAL/INDUSTRIAL – Seasonal Flows

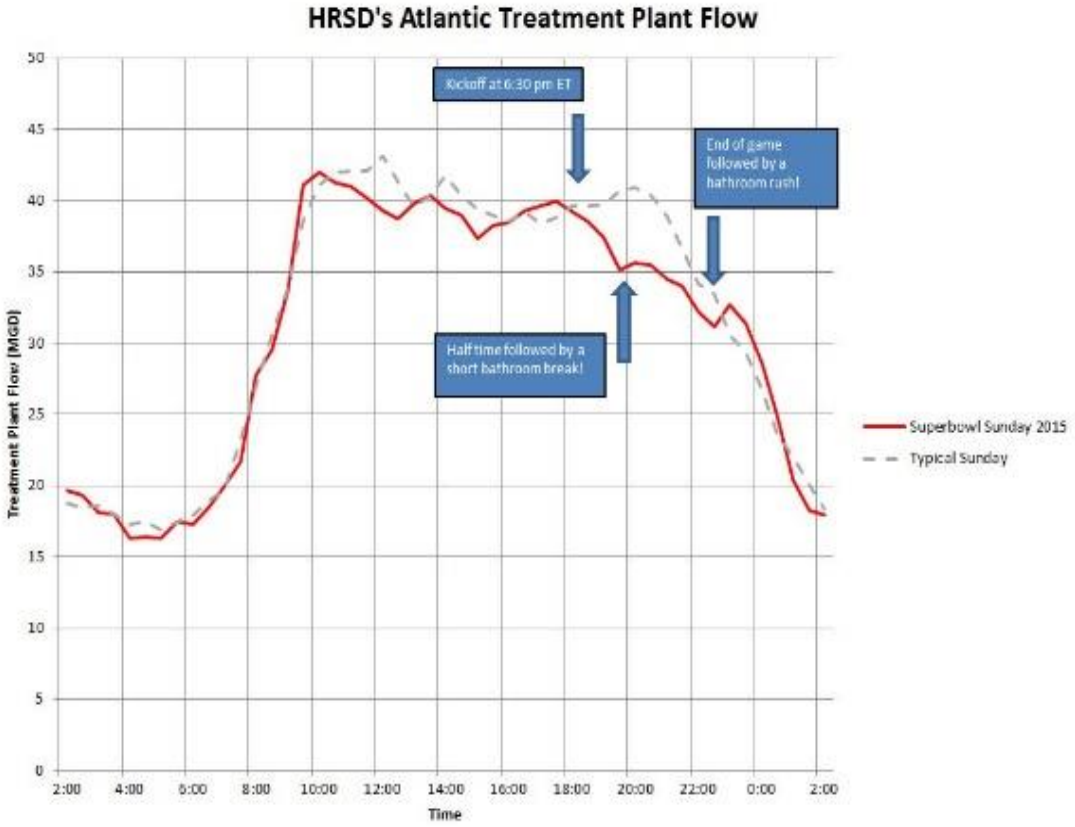
Example: Canneries are highly seasonal in their operations and easy to predict when to expect high flows from them.

Process Description

Industrial Pre-Treatment

Process Description

Super Bowl Flow



Process Description

Travel Time / Aging Problems

- H2S released from anaerobic bacterial feeding on aging sewage
- Worse when the weather is hot
- Aged sewage is difficult to treat
- Corrosion and odor issues

Process Description

Treatment Process

- Screening
- Grit Removal
- Pre-Aeration
- Flowmeter

Process Description

Screening

Removes roots, rags, cans, & large debris – haul to landfill or, if possible, grind and return to plant flow.

Process Description

Grit Removal

Removes sand and gravel – haul to a landfill.

Process Description

Pre-Aeration

Freshens wastewater & helps to remove oil.

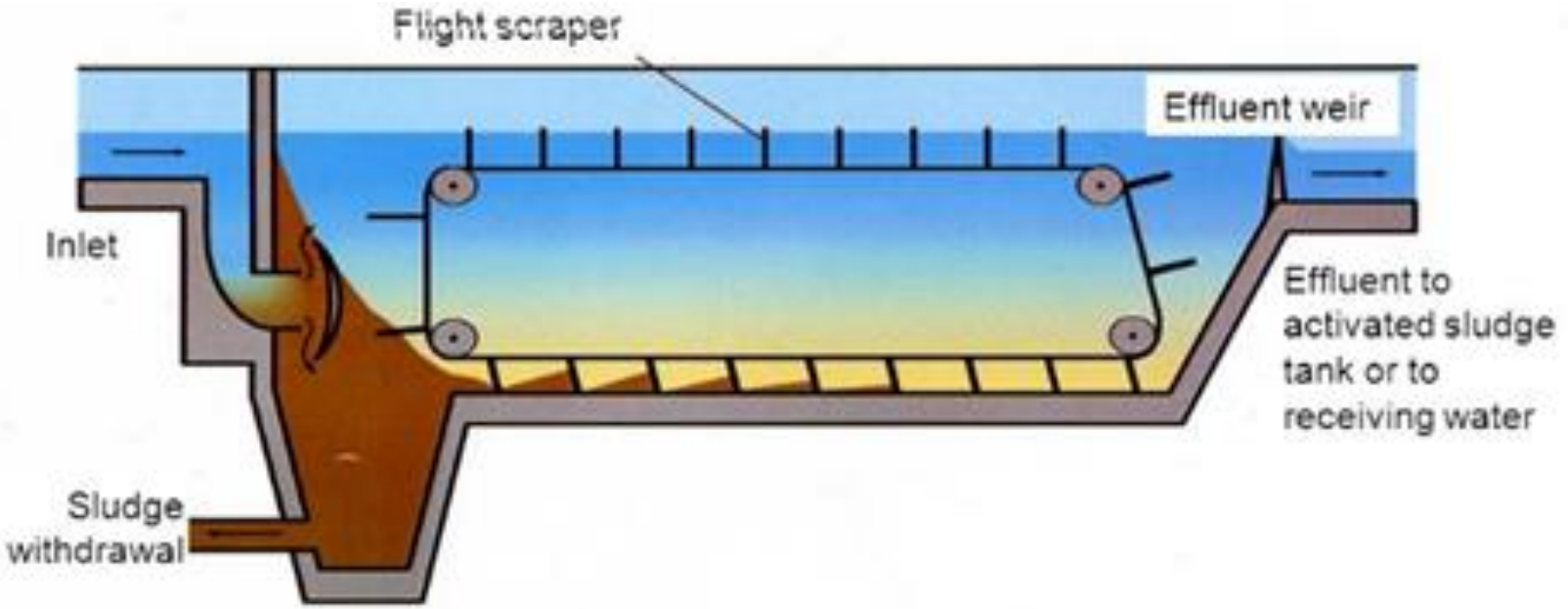
Process Description

Primary Treatment

- Sedimentation
- Floatation

Process Description

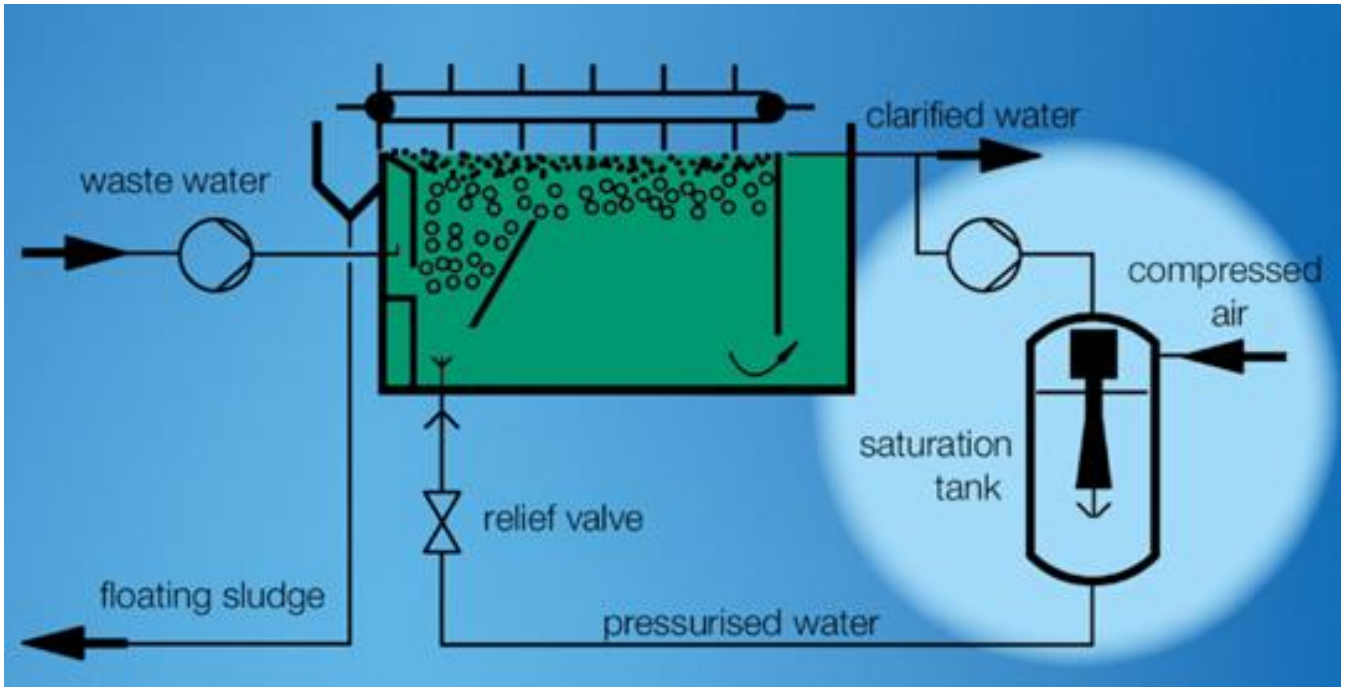
Sedimentation



Removes settleable solids.

Process Description

Flotation



Removes floatable materials.

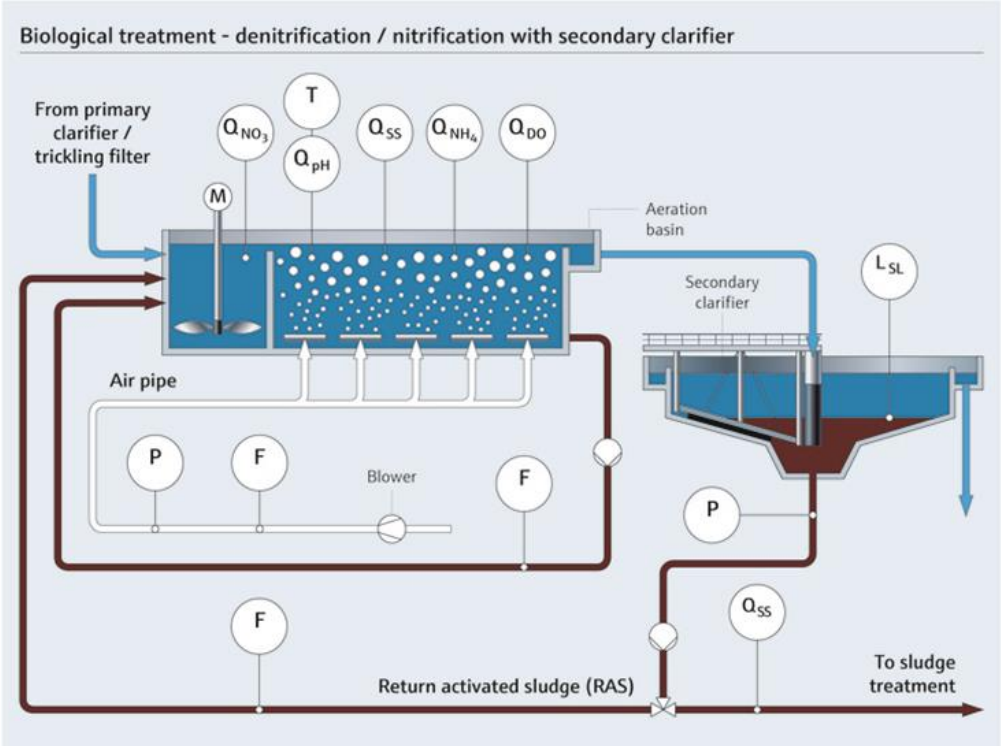
Process Description

Secondary Treatment

- Biological Process
- Chemical Process
- Physical Process

Process Description

Biological Process



Removes suspended and dissolved solids.

Process Description

Chemical Process

CHEMICAL PROCESSES

- Chlorination.
- Ozonation.
- Neutralization.
- Coagulation.
- Adsorption.
- Ion Exchange.

Process Description