

Wastewater Treatment

Wastewater Treatment

❖ Purpose:

To manage water discharged from homes, businesses, and industries to reduce the threat of water pollution.

Wastewater Treatment

- ❖ Pre-treatment
- ❖ Preliminary treatment
- ❖ Primary treatment
- ❖ Secondary treatment
- ❖ Sludge (biosolids) disposal

Wastewater Treatment

❖ Pre-treatment

- Occurs in business or industry prior to discharge
- Prevention of toxic chemicals or excess nutrients being discharged in wastewater

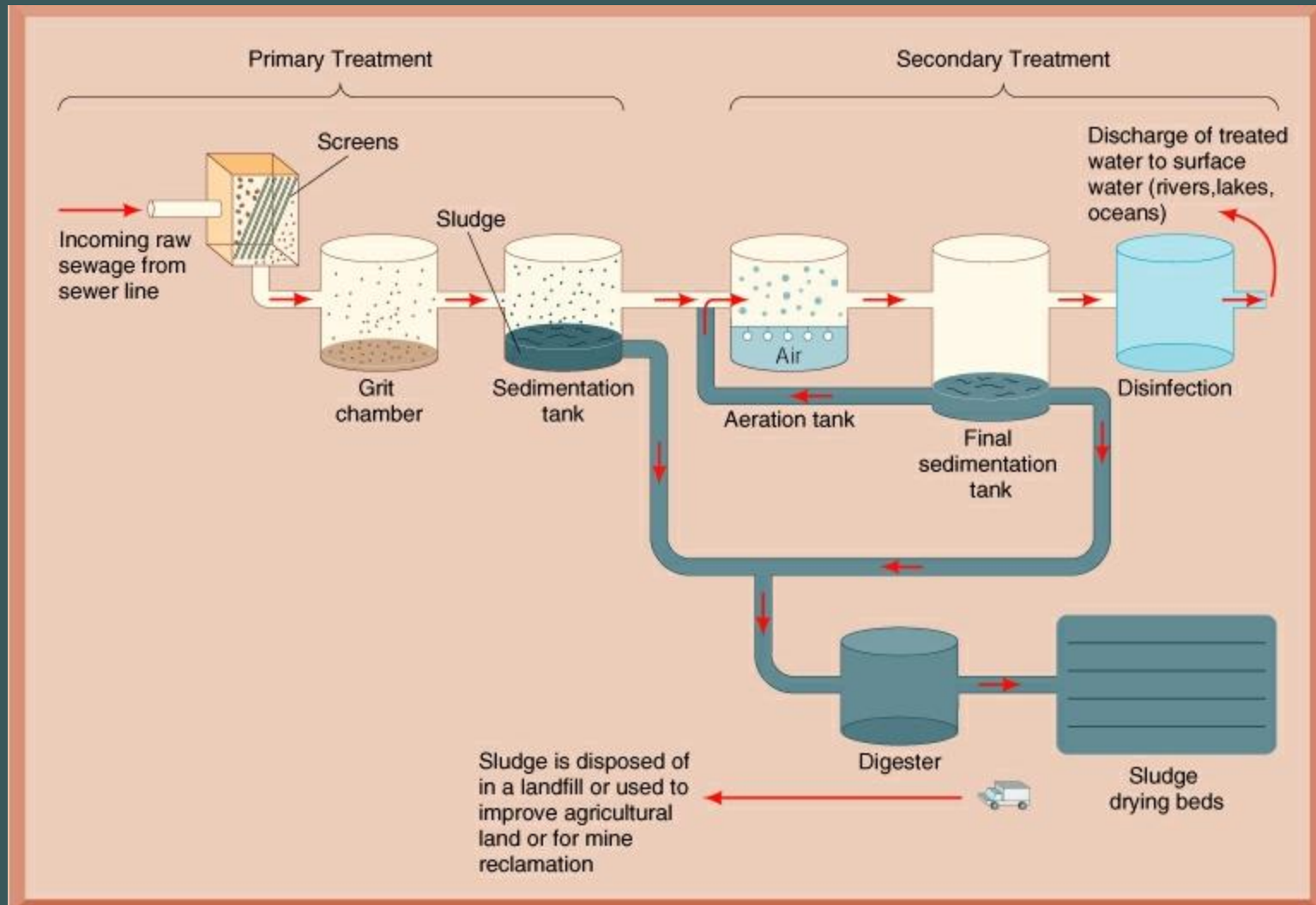
Wastewater Treatment

- ❖ Water discharged from homes, businesses, and industry enters sanitary sewers
- ❖ Water from rainwater on streets enters storm water sewers
- ❖ Combined sewers carry both sanitary wastes and storm water

Wastewater Treatment

- ❖ Water moves toward the wastewater plant primarily by gravity flow
- ❖ Lift stations pump water from low lying areas over hills

Wastewater Treatment



Wastewater Treatment

❖ Preliminary Treatment

- removes large objects and non-degradable materials
- protects pumps and equipment from damage
- bar screen and grit chamber

Wastewater Treatment

❖ Bar Screen

- catches large objects that have gotten into sewer system such as bricks, bottles, pieces of wood, etc.



Wastewater Treatment

❖ Grit Chamber

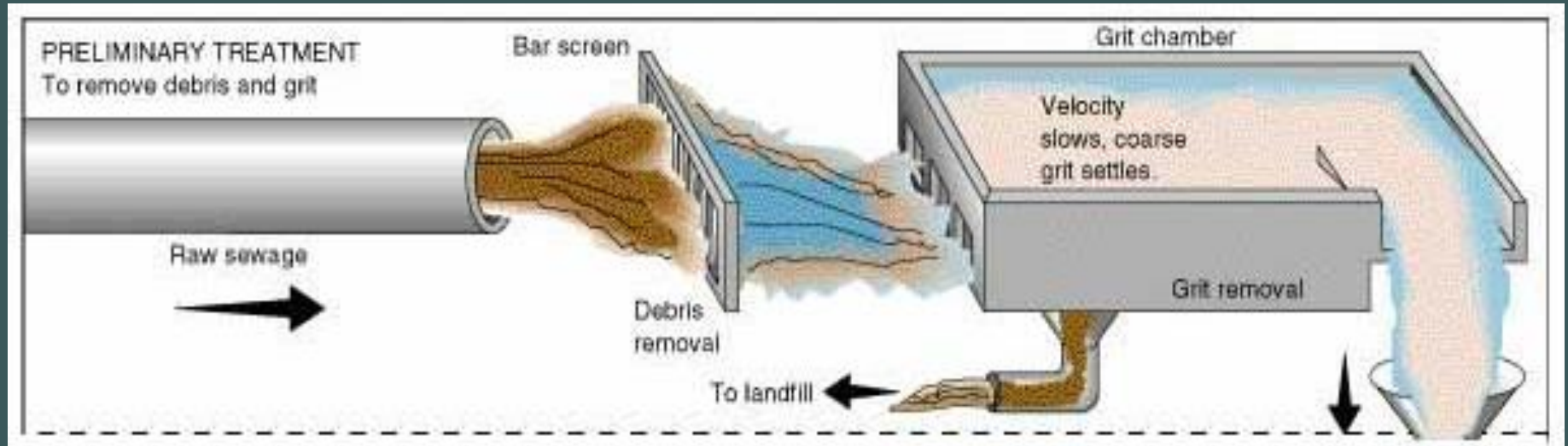
- removes rocks, gravel, broken glass, etc.

❖ Mesh Screen

- removes diapers, combs, towels, plastic bags, syringes, etc.

Wastewater Treatment

❖ Preliminary Treatment



Wastewater Treatment

- ❖ Measurement and sampling at the inlet structure
 - a flow meter continuously records the volume of water entering the treatment plant
 - water samples are taken for determination of suspended solids and B.O.D.

Wastewater Treatment

- ❖ Suspended Solids – the quantity of solid materials floating in the water column
- ❖ B.O.D. = Biochemical Oxygen Demand
 - a measure of the amount of oxygen required to aerobically decompose organic matter in the water

Wastewater Treatment

- ❖ Measurements of Suspended Solids and B.O.D. indicate the effectiveness of treatment processes
- ❖ Both Suspended Solids and B.O.D. decrease as water moves through the wastewater treatment processes

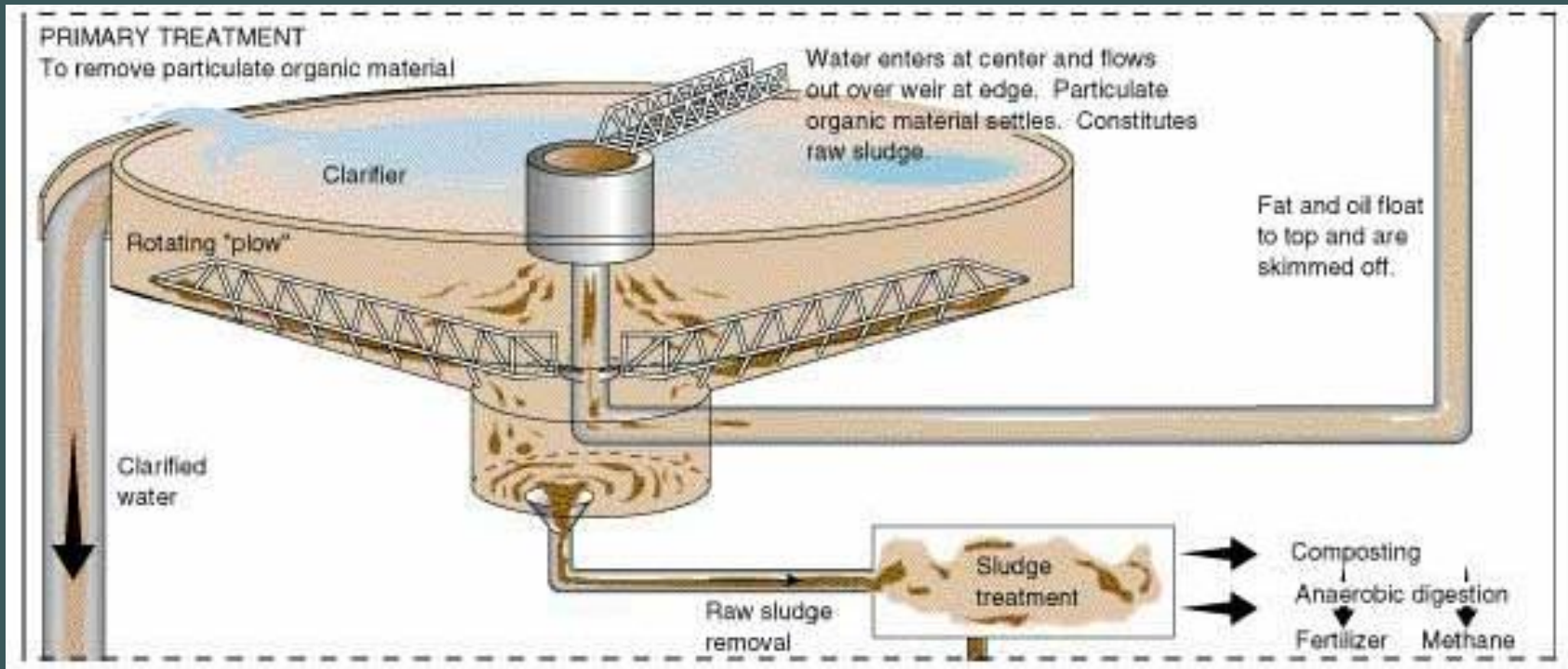
Wastewater Treatment

❖ Primary Treatment

- a physical process
- wastewater flow is slowed down and suspended solids settle to the bottom by gravity
- the material that settles is called sludge or biosolids

Wastewater Treatment

❖ Primary Treatment



Wastewater Treatment

❖ Primary Treatment



Wastewater Treatment

❖ Primary Treatment



Wastewater Treatment

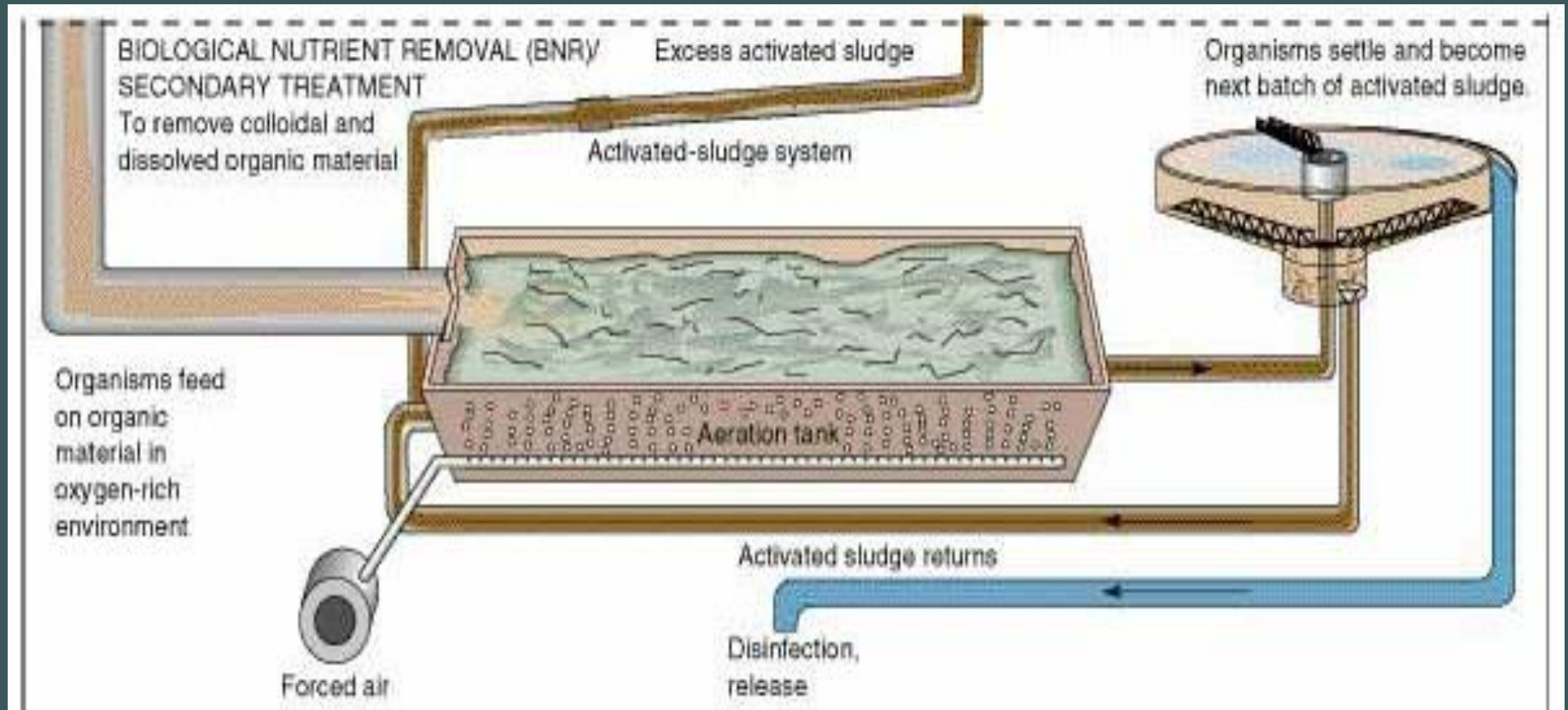
- ❖ Sludge from the primary sedimentation tanks is pumped to the sludge thickener.
 - more settling occurs to concentrate the sludge prior to disposal

Wastewater Treatment

- ❖ Primary treatment reduces the suspended solids and the B.O.D. of the wastewater.
- ❖ From the primary treatment tanks water is pumped to the trickling filter for secondary treatment.
- ❖ Secondary treatment will further reduce the suspended solids and B.O.D. of the wastewater.

Wastewater Treatment

❖ Secondary Treatment



Wastewater Treatment

❖ Secondary Treatment

- ❖ Secondary treatment is a biological process
- ❖ Utilizes bacteria and algae to metabolize organic matter in the wastewater
- ❖ In Cape Girardeau secondary treatment occurs on the trickling filter

Wastewater Treatment

❖ Secondary Treatment

- ❖ the trickling filter does not “filter” the water
- ❖ water runs over a plastic media and organisms clinging to the media remove organic matter from the water

Wastewater Treatment

- ❖ From secondary treatment on the trickling filter water flows to the final clarifiers for further removal of sludge.
- ❖ The final clarifiers are another set of primary sedimentation tanks.
- ❖ From the final clarifiers the water is discharged back to the Mississippi River.

Wastewater Treatment

- ❖ The final clarifiers remove additional sludge and further reduce suspended solids and B.O.D.



Wastewater Treatment

❖ Disposal of Sludge or Biosolids

- the sludge undergoes lime stabilization (pH is raised by addition of lime) to kill potential pathogens
- the stabilized sludge is land applied by injection into agricultural fields

Wastewater Treatment

❖ Disposal of Sludge or Biosolids

- in the past, Cape Girardeau disposed of the sludge by landfill or incineration
- landfill disposal discontinued to the threat of leachate
- incineration discontinued because of the ineffectiveness and cost

Wastewater Treatment

- ❖ The final part of the field trip tour will be in the treatment plant lab.



Wastewater Treatment

- ❖ The wastewater plant lab conducts a number of measurements and tests on the water.

suspended solids

B.O.D.

pH

temperature

nitrogen

phosphorus

Wastewater Treatment

- ❖ In addition to test performed at the wastewater lab, an off-site contract lab performs additional tests

heavy metals priority pollutants

W.E.T (Whole Effluent Toxicity) tests

Wastewater Treatment

❖ Governmental Agencies monitor
wastewater treatment plants

U.S. Environmental Protection Agency

Missouri Department of Natural Resources