

Remove nutrients

1-Nitrogen control: ammonia in waste water effluent can be toxic to aquatic life in certain instances by providing additional biological treatment beyond the secondary stage nitrifying bacteria present in wastewater can biologically convert ammonia to the nontoxic nitrate through process known as nitrification the nitrification process is normally sufficient to remove the toxicity associated with ammonia in the effluent since nitrate is nutrient excess amounts can contribute to eutrophication in the receiving waters in situations where nitrogen must be completely removed from effluent an additional biological process can be added to the system to convert the nitrate to nitrogen gas the conversion of nitrate to nitrogen gas is accomplished by bacteria in a process known as denitrification effluent with nitrogen in the form of nitrate is placed into a tank devoid of oxygen where carbon containing chemicals such as methanol are added in this oxygen free environment bacteria use the oxygen attached to the nitrogen in the nitrate form releasing nitrogen gas because nitrogen comprises almost 80% of the air in the earth atmosphere the release of nitrogen into the atmosphere does not cause any environmental harm

2-phosphorus control: like nitrogen phosphorus is a necessary nutrient for the growth of algae phosphorus reduction is often needed to prevent eutrophication before discharging effluent into lakes reservoirs and estuaries phosphorus can be removed biologically in a process called enhanced biological phosphorus removal in this process specific bacteria called polyphosphate accumulating organism PAOS accumulating large quantities of phosphorus within their cells up to 20% of their mass when the biomass enriched in these bacteria is separated from the treated water these bio solids have a high fertilizer value phosphorus removal can also be achieved by chemical precipitation usually with salts or iron alum or lime this may lead to excessive sludge production as hydroxides precipitates and the added chemicals can be expensive despite this chemical phosphorus removal requires a significantly smaller equipment than biological removal is easier to operate and is often more reliable than biological phosphorus removal

Fog removal

Fatty organic materials from animals, vegetables, and petroleum also are not quickly broken down by bacteria and can cause pollution in receiving environments. When large amounts of oils and greases are discharged to receiving waters from community systems, they increase BOD and they may float to the surface and harden, causing aesthetically displeasing conditions. They also can trap

trash, plants, and other materials, causing foul odors, attracting flies and mosquitoes and other disease vectors. In some cases, too much oil and grease causes septic conditions in ponds and lakes by preventing oxygen from the atmosphere from reaching the water. The removal of oil and grease depends on the condition of the oil water mixture the type of the equipment must be carefully selected the type of oil water mixture may be classified as oil and grease present as septic free oil dispersed oil, emulsified oil or dissolved oil the API separator is to separate free oil from waste water such gravity separators will not separate oil drops smaller than the size of free oil nor will it break down emulsion the dissolved air flotation DAF devices utilize the gravity separation concept for the removal of oil and grease from wastewater but tend to be more effective than API separators in removing the dispersed oil mixture because the buoyancy differential is increased by induced small air bubbles

Coagulant aids such as polyelectrolytes are commonly used to promote agglomeration of the oil bearing matter into large flocs which are more easily removed the DAF device is reported effective in producing an effluent with 1 to 20 mg/l of oil and grease carbon adsorption or membrane filtration using reverse osmosis treatment is very effective to remove dissolved and emulsified oils biologically treatment is generally effective in degrading dissolved oils and other types of stabilized emulsions which cannot be destabilized by chemical coagulants however a biological system is only effective on highly dilute oil contaminated wastewater because mineral based oils are adsorbed by the microorganisms faster than they can be metabolized in activated sludge systems the adsorbed oil tends to damage sludge settling characteristics and cause system failure it has been reported that biological organisms are efficient in oxidizing dispersed or emulsified oil but large amounts of free oil must be avoided

In these reservoirs wastewater is stored for long periods of time

The purpose of the storage is twofold

To obtain highly quality effluents wastewater treatment wastewater irrigation projects must match the almost homogenous sewage flow coming from the city to the discontinuous water demand for irrigation wastewater storage reservoirs add

flexibility to the operation system optimize the reuse of the reclaimed water increase the area which can be irrigated and release effluents of a good and reliable quality these waste water storage and treatment reservoirs can be also applied to other situations

Coastal areas wastewater is stored during the summer in order to avoid the contamination of beaches during the summer in order to avoid the contamination of beaches during the tourism season by the end of summer when the last tourist has gone wastewater will be released from the reservoirs into the sea meanwhile these effluents will reach excellent quality due to long residence time within the reservoirs during the summer months

River stream recovery 1 wastewater is stored during the dry season when the river runs at minimum flow wastewater of high quality will be released from the reservoirs to the river when river flow is at maximum thus obtaining maximum dilution and minimum negative ecological impact

River stream recovery 2 wastewater is stored when river flow is at maximum wastewater of very high quality is then released from the reservoirs to the river during the dry period as a substitute for freshwater in order to avoid total drying of the river and ecosystem destruction

High quality effluents are required wastewater contains not only organic matter but also significant concentrations of pathogens heavy metals hard detergents pesticides organic micro pollutants and other pollutants which are not removed by classic sewage treatment plants stabilization reservoirs are able to remove most of them

Cooling water wastewater is more and more used as cooling water in power stations and other installations wastewater storage reservoirs can supply cooling towers with wastewater of proper quality and temperature in due time

Besides, stabilization reservoirs are green

Processes occurring within the reservoirs are natural they utilize solar energy (mechanical plants use electricity) algae within the reservoirs produce most of the oxygen required by the processes mechanical plants take oxygen from the atmosphere with high energy consumption

Aquatic birds find the reservoirs a good refuge this is important in areas where the natural habitat of the birds have been invaded by urban tourism or agriculture development