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CASE STUDY ON SEWAGE TREATMENT PLANT

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ABSTRACT

The polluted water that runs off of homes and residential society from washing, using bathrooms, and all the soapy water you get from washing dishes in the kitchen, etc. is called sewage or sewage.

Storm water and industrial waste that goes into sewers also fall into this category. Wastewater is treated in a variety of ways to make it suitable for its intended use, whether it is sprayed on irrigated fields (irrigating crops) or for human consumption. Wastewater treatment mainly occurs in two main stages: primary treatment and secondary treatment. In addition, in arid regions with insufficient water resources, wastewater is treated three times to meet the needs of drinking water supply.

In the primary treatment process, the suspended solids are separate out from the water, and the BOD (biochemical oxygen demand) in the water is decreased to prepare for the next step of wastewater treatment. Secondary processing can be accomplished in a number of ways. However, in our project and poster we only focus on the two most commonly used processes, activated sludge. The activated sludge process uses air and biological floes composed of bacterial protozoa. This "aeration" lasts for 4-6 hours, after which it is stopped and the contents are transferred to sedimentation tanks. The floc settles in the sedimentation tank and takes most of the organic matter with it. This process removes 75-95% of BOD. The water is then sanitized, usually by chlorination, before it is discharged into a flowing stream or ocean.

I. INTRODUCTION

Pollution in the broadest sense includes all changes that limit the benefits of nature and adversely affect life. The crisis caused by rapidly growing population and industrialization and the ensuing environmental damage seriously threaten the quality of life. Water quality degradation is an adverse change in the physical, chemical and biological properties of water that prevents its domestic, commercial, industrial, agricultural, recreational and other beneficial uses. Sewage and sewage are major sources of water pollution. Wastewater mainly includes human feces, domestic waste (including washing water) and industrial waste. The growing need to purify wastewater from environmental pollution has led to investigations into the characterization of wastewater, especially domestic wastewater. Sewage Treatment Plant is a facility designed to receive the waste from domestic, commercial and industrial sources and to remove materials that damage water quality and compromise public health and safety when discharged into water receiving systems. It includes physical, chemical, and biological processes to remove various contaminants depending on its constituents.

In other words, wastewater treatment is the process of removing pollutants from sewage and domestic sewage, both sewage (sewage) and domestic sewage. The goal is to produce treated wastewater and solid waste or sludge suitable for discharge or reuse in the environment. This material is often accidentally contaminated with many toxic organic and inorganic compounds. Liquid waste must be treated before being discharged into water or otherwise disposed of in a manner that does not endanger public health or create an objectionable situation. As cities have grown, more primitive methods of manure disposal have given way to waterborne sewage systems. Even in small towns, where sewers were more secure, more convenient, and free from disturbance, introduced sewer where finances permitted.

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Fig.1&2: Sewage Treatment Plant.

1.1 BASIC OF SEWAGE TREATMENT PLANT

1.1.1 GENERAL BACKGROUND:

Sewage is not just sewage. All water used in the home that goes into the sewer or drain is wastewater. This includes water from bathrooms, showers, sinks, dishwashers, washing machines and toilets. Small businesses and industries often discharge large volumes of wastewater into wastewater collection systems; others operate their own wastewater treatment systems. In municipal water mixing systems, water from storm sewers is also mixed into the municipal wastewater stream. The average American produces 265-568 liters (66 to 192 gallons) of wastewater per day. Wastewater is approximately 99% water by weight and is commonly referred to as influent when it enters a wastewater treatment plant. "Household wastewater" means wastewater that originates primarily from individuals and generally excludes industrial or agricultural wastewater

At wastewater treatment shops, this inflow is treated before it's allowed to be returned to the terrain, lakes, or aqueducts. There are no leaves for wastewater treatment, and utmost shops operate 24 hours per day every day of the week. Wastewater treatment shops operate at a critical point of the water cycle, helping nature defend water from inordinate pollution. utmost treatment shops have primary treatment(physical junking of floatable and settled solids) and secondary treatment(the natural junking of dissolved solids).

1.1.2 HISTORY OF SEWAGE TREATMENT PLANT

Numerous ancient metropolises had drainage systems, but they were primarily intended to carry rainwater down from roofs and pavements. A notable illustration is the drainage system of ancient Rome. It included numerous face conduits that were connected to a large bounded channel called the Cloaca Maxima(" Great Sewer "), which carried drainage water to the Tiber River.

There was little progress in civic drainage or sewerage during the Middle periods. Privy vaults and sinks were used, but utmost wastes were simply ditched into gutters to be flushed through the rainspouts by cataracts. Toilets(water closets) were installed in houses in the early 19th century, but they were generally connected to sinks, not to seamsters. In densely peopled areas, original conditions soon came intolerable because the sinks were infrequently voided and constantly overflowed. The trouble to public health came apparent. In England in the middle of the 19th century, outbreaks of cholera were traced directly to well- water inventories defiled with mortal waste from privy vaults and sinks. It soon came necessary for all water closets in the larger municipalities to be connected directly to the storm seamsters. This transferred sewage from the ground near houses to near bodies of water. therefore, a new problem surfaced face water pollution.

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DEVELOPMENTS IN SEWAGE TREATMENT

It used to be said that " the result to pollution is dilution. " When small quantities of sewage are discharged into a flowing body of water, a natural process of sluice tone- sanctification occurs. Densely peopled communities induce similar large amounts of sewage, still, that dilution alone doesn't help pollution. This makes it necessary to treat or purify wastewater to some degree before disposal.

The construction of centralized sewage treatment shops began in the late 19th and early 20th centuries, basically in the United Kingdom and the United States. rather of discharging sewage directly into a near body of water, it was first passed through a combination of physical, natural, and chemical processes that removed some or utmost of the adulterants. Also beginning in the 1900s, new sewage- collection systems were designed to separate storm water from domestic wastewater, so that treatment shops didn't come overloaded during ages of wet rainfall.

After the middle of the 20th century, adding public concern for environmental quality led to broader and more strict regulation of wastewater disposal practices. Advanced situations of treatment were needed. For illustration, pre treatment of artificial wastewater, with the end of precluding poisonous chemicals from snooping with the natural processes used at sewage treatment shops, frequently came a necessity. In fact, wastewater treatment technology advanced to the point where it came possible to remove nearly all adulterants from sewage. This was so precious, still, that similar high situations of treatment weren't generally justified.

Wastewater treatment shops came large, complex installations that needed considerable quantities of energy for their operation. After the rise of oil painting prices in the 1970s, concern for energy conservation came a more important factor in the design of new pollution control systems. Accordingly, land disposal and subsurface disposal of sewage began to admit increased attention where doable. similar " low- tech " pollution control styles not only might help to conserve energy but also might serve to reclaim nutrients and replenish groundwater inventories.

1.1.3 OBJECTIVES OF WASTEWATER TREATMENT:

1. To improve quality of wastewater.
2. Elimination of pollutants, toxicants and many such.
3. Preservation of water quality of natural water.
4. To make wastewater usable for other purposes.
5. Prevention of harmful diseases.
6. Removal of floatable and postponed particle.
7. Removal of BOD.
8. To prevent the destruction of aquatic life.

1.1.4 IMPORTANCE OF SEWAGE TREATMENT PLANT

1. It's veritably important to give some degree of treatment to waste part of before it can be used in husbandry geography irrigation or for aqua dressed.

2. The top ideal of sewage treatment is generally to allow mortal rich to be disposed without damage to mortal health and on respectable damage to the natural terrain.

3. According to exploration, number of people dies from water Bond conditions is utmost of the developing countries. There for it's veritably important to get the property treatment of water for healthy living.

4. Wastewater treatment factory plays an important part for the humanity.

5. The main function of these shops is to make the water of the waste water that comes from home, marketable and artificial sectors.

6. The treatment of waste water has come the need of the hour as it stops spreading the conditions and illness caused by the waste water.

7. It helps society in making the water as well as terrain clean.

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8. The treatment factory works composed of 3. The three stages of these shops include the primary stage, the secondary stage and the tertiary stage.

1.1.5 ADVANTAGES

1. It is an easy and effective method to reduce the amount of sewage and pollutant from the water. It minimizes wastes.
2. Wastewater treatment is the best option to use the contaminated water in a better way.
3. It provides clean and safe water and with the help of a sewage treatment plant the water can be reused.
4. A technique that is used in order to save water.
5. Sewage treatment plant reduces disease caused by waste water.
6. It prevents the emission of polluted or foul odour.
7. More availability of water for irrigation and green belt.
8. Because of sewage treatment plant, water demand reduced by 40 – 50%.

1.1.6 DISADVTANTAGES

1. Chemical destroys the bacteria that digest the sludge.
2. Chemical increases the cost of sedimentation.
3. Skilled supervision is required.
4. It requires a large space for setup.
5. The installation cost and power supply are very much high.
6. The use of bacteria makes the plants smelly.
7. Waste water absorption can affect the wet area or during excessively rainy period.
8. Large quantity of sludge is produced.

II. MATERIALS & METHODS OF SEWAGE TREATMENT PLANT

2.1 COMPONENT OF SEWAGE TREATMENT PLANT:

2.1.1 BAR SCREENING: A bar screen is a mechanical sludge used to remove large objects, similar as rags and plastics, from wastewater. It's part of the primary filtration inflow and generally is the first, or primary, position of filtration, being installed at the affluent to a wastewater treatment factory.

2.1.2 GRIT CHAMBER: Grit chambers are long narrow tanks that are designed to decelerate down the inflow so that solids similar as beach, coffee ground, and eggshells will settle out of the water. Grit causes inordinate wear and tear and gash on pumps and other factory outfit.

2.1.3 PRIMARY CLARIFIER: Primary explanation, also known as sedimentation, is the first step in the water treatment process for removing suspended solids(TSS), oil painting and grease. During this step, solids floating at the face and other large patches from the water or wastewater inflow are removed before natural treatment. Sludge is settled to the bottom of the purifier basins and collected by a rake and removed by a sludge junking system. Meanwhile, oil painting and grease pier to the face and is skimmed off. A typical primary purifier removes 60 percent of suspended solids and 30 to 40 percent of Biological Oxygen Demand(duck).

2.1.4 AERATION TANK: Aeration is the process of adding air into wastewater to allow aerobic biodegradation of the organic accoutrements.

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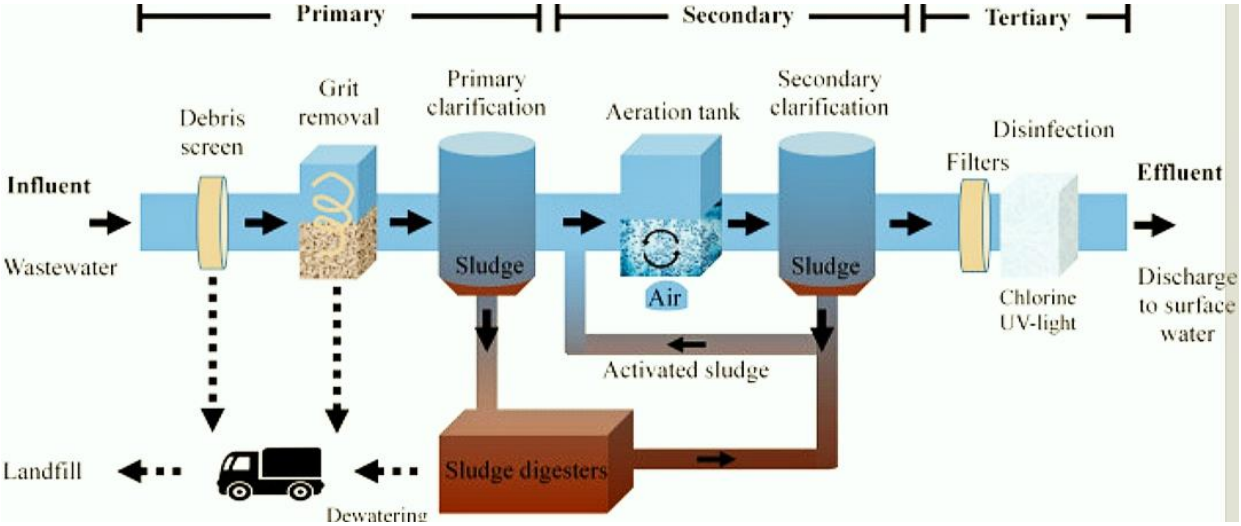

Fig 3: Sewage Treatment Plant Flowchart

2.1.5 SECONDARY CLARIFIER: Secondary explanation follows the natural treatment process with the main thing of returning actuated sludge. During the secondary explanation process the biomass from microorganisms settles to the bottom in the form of actuated sludge. After settling over a period of time, the biomass of microorganisms is returned to the aeration tank with the cycle repeating until the effluent is clean before transferred for filtration and/ or disinfection.

2.1.6 SLUDGE DIGESTER: Sludge digestion is a natural process in which organic solids are perished into stable substances. Digestion reduces the total mass of solids, destroys pathogens, and makes it easier to dewater or dry the sludge. Digested sludge is innocuous, having the appearance and characteristics of a rich replanting soil.

2.1.7 DISINFECTANT TANK: It's generally a final step to remove organisms from the treated water before the effluent is released back into the water system. Disinfection prevents the spread of water borne conditions by reducing microbes and bacterial figures to a regulated position.

2.2 PROCESS & METHOD

2.2.1 AEROBIC TREATMENT OR DECOMPOSITION: Aerobic, as the title suggests, means in the presence of air(oxygen); while anaerobic means in the absence of air(oxygen). These two terms are directly related to the type of bacteria or microorganisms that art involved in the declination of organic contaminations in a given wastewater and the operating conditions of the bioreactor. thus, aerobic treatment processes take place in the presence of air and use those microorganisms(also called aerobes) which use molecular/ free oxygen to assimilate organic contaminations i.e. convert them into carbon dioxide, water and biomass.

2.2.2 ANAEROBIC TREATMENT: The anaerobic treatment process, takes place in the absence of air(and therefore molecular/ free oxygen) by those microorganisms(also called anaerobes which don't bear air(molecular/ free oxygen) to assimilate organic contaminations. The final products of organic assimilation in anaerobic treatment are methane and carbon dioxide gas and biomass.

2.2.3 PRELIMINARY & PRIMARY TREATMENT: As sewage enters a factory for treatment, it flows through a screen, which removes large floating objects similar as rags and sticks that might clog pipes or damage outfit. After sewage has been screened, it passes into a fortitude chamber, where cinders, beach, and small monuments settle to the bottom. A fortitude chamber is particularly important in communities with combined seamster systems where beach or clay may wash into seamsters along with storm water. After webbing is completed and fortitude has been removed, sewage still contains organic and inorganic matter along with other suspended solids.

These solids are minute patches that can be removed from sewage in a sedimentation tank. When the speed of the inflow through one of these tanks is reduced, the suspended solids will gradationally sink to the bottom, where they form a mass of solids called raw primary memoir solids formerly sludge). Bio solids are generally removed from tanks by pumping, after which it may be further treated for use as a toxin, or disposed of in a

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land fill or incinerated. Over the times, primary treatment alone has been unfit to meet numerous communities' demands for advanced water quality. To meet them, metropolises and diligence typically treat to a secondary treatment position, and in some cases, also use advanced treatment to remove nutrients and other pollutants.

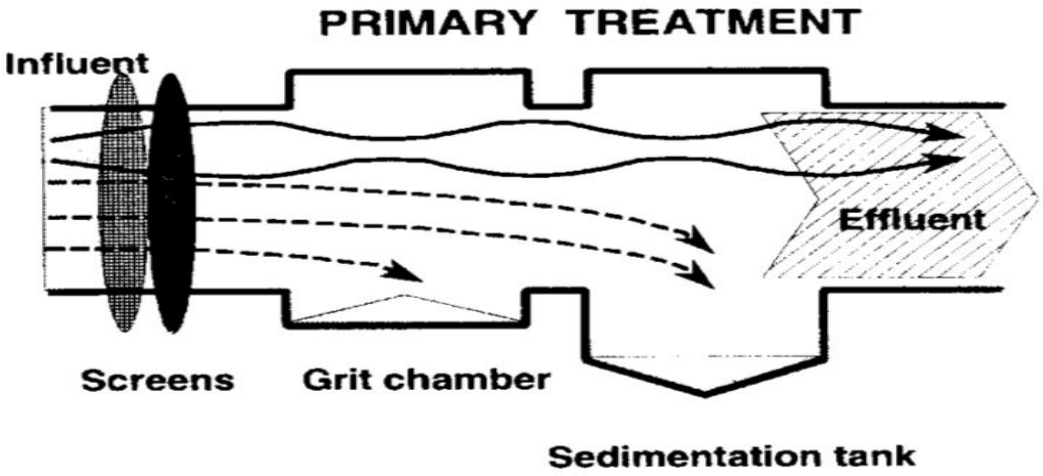

Fig 4: Primary Treatment Process

2.2.4 SECONDARY & TERTIARY TREATMENT: The secondary stage of treatment removes about 85 percent of the organic matter in sewage by making use of the bacteria in it. The top secondary treatment ways used in secondary treatment are the trickling sludge and the actuated sludge process. After effluent leaves the sedimentation tank in the primary stage it flows or is pumped to a installation using one or the other of these processes. A trickling sludge is simply a bed of monuments from three to six bases deep through which sewage passes.

More lately, interlocking pieces of corrugated plastic or other synthetic media have also been used in trickling beds. Bacteria gather and multi- ply on these monuments until they can consume utmost of the organic matter. The cleanser water trickles out through pipes for farther treatment. From a trickling sludge, the incompletely treated sewage flows to another sedimentation tank to remove redundant bacteria. The trend moment is towards the use of the actuated sludge process rather of trickling pollutants. The actuated sludge process speeds up the work of the bacteria by bringing air and sludge heavily laden with bacteria into close contact with sewage. After the sewage leaves the settling tank in the primary stage, it's pumped into an aeration tank, where it's mixed with air and sludge loaded with bacteria and allowed to remain for several hours. During this time, the bacteria break down the organic matter into harmless by-products.

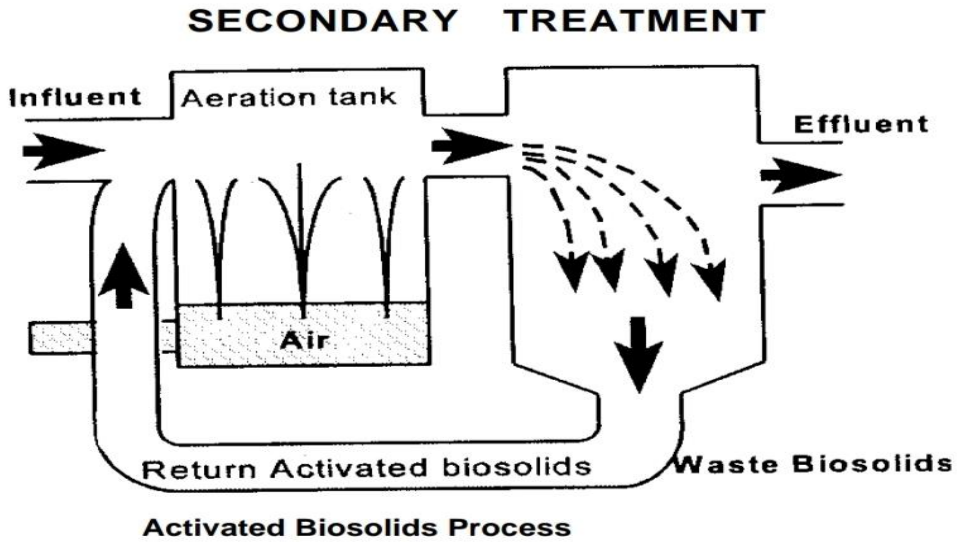

Fig 5: Secondary Treatment Process

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The sludge now actuated with fresh billions of bacteria and other bitsy organisms, can be used again by returning it to the aeration tank for mixing with air and new sewage. From the aeration tank, the incompletely treated sewage flows to another sedimentation tank for junking of redundant bacteria. To complete secondary treatment, effluent from the sedimentation tank is generally disinfected with chlorine before being discharged into entering waters. Chlorine is fed into the water to kill pathogenic bacteria, and to reduce odour. Done duly, chlorination will kill further than 99 percent of the dangerous bacteria in an effluent. Some cosmopolises now manufacture chlorine result on point to avoid transporting and storing large quantities of chlorine, occasionally in a gassy form. numerous countries now bear the junking of redundant chlorine before discharge to face waters by a process calledde-chlorination. Alternatives to chlorine disinfection, similar as ultraviolet light or ozone, are also being used in situations where chlorine in treated sewage backwaters may be dangerous to fish and other submarine life.

Tertiary wastewater treatment(or advanced wastewater treatment) is the fresh treatment demanded to remove suspended, colloidal and dissolved ingredients remaining after the conventional secondary treatment. It's generally espoused when the wastewater is to be reused. The main end of tertiary wastewater treatment is that the quality of the treated water should meet the norms for the specified use. For illustration, if the effluent is coming from a wastewater treatment factory, the bacteriological quality won't be meeting the drinking water norms and there will be so numerous organic accoutrements present in it, both biodegradable andnon-biodegradable, which need to be removed for the force of water to public. The adulterants which are to be removed include simple organic ions like calcium, potassium, sulphate, nitrates, etc. and also large number of largely complex organic composites.

III. RESULT

So that its all conclusion is that the sewage treatment factory is veritably necessary in all District. This treated water can be used for construction work, our main end is that the waste water treated and also we can use in our CIVIL's field in construction work.

Also this water can be use for irrigation and indeed also for drinking purpose after the tertiary treatment.

IV. CONCLUSION

1. From the below discussion it can be concluded that in the developed countries important work has been done in the field of wastewater exercise system but we can not say the same about developing countries. In developing countries wastewater exercise is still in the morning stage and important work is demanded in that field.

2. Wastewater treatment performance now a day big problem if we ameliorate our methodology, we surely answered big problem.

3. There are plenitude of arising technology which are making increase performance of wastewater in reused system. But we used only applicable technology whom suitable.

4. In Indian conditions, succession batch reactor process is more provident and more effective. It's a completely chemical process which is great for non-portable purpose. It needs lower land but demand of external energy source for its neration and equalization along with chemical costs makes it expensive.

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