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Study on Sewage Treatment Plant

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Abstract: *Sewage treatment (or domestic wastewater treatment, municipal wastewater treatment) is a type of wastewater treatment which aims to remove contaminants from sewage to produce an effluent that is suitable for discharge to the surrounding environment or an intended reuse application, thereby preventing water pollution from raw sewage discharges. Sewage contains wastewater from households and businesses. There is a high number of sewage treatment processes to choose from. These can range from decentralized systems (including on-site treatment systems) to large centralized systems involving a network of pipes and pump stations (called sewerage) which convey the sewage to a treatment plant. For cities that have a combined sewer, the sewers will also carry urban runoff (storm water) to the sewage treatment plant. Sewage treatment often involves two main stages, called primary and secondary treatment, while advanced treatment also incorporates a tertiary treatment stage with polishing processes and nutrient removal. Secondary treatment can reduce organic matter (measured as biological oxygen demand) from sewage, using aerobic or anaerobic biological processes.*

Keywords: Sewage treatment

I. INTRODUCTION

The scope of PDMC under the proposed mission will be divided into four broad components namely Planning, Design and Supervision and Project Management. The PDMC's scope includes among others, preparation of City-Wide Concept Plan, Service Level Improvement Plan (SLIP) and State Annual Action Plan (SAAP). PDMC will identify projects on the basis of SLIP framework, and carry out required investigation, design, procurement and implementation. The PDMC will also ensure compliance and monitoring of the project activities using PMIS / latest IT tools and techniques such as online monitoring of work sites with the aid of cyber tools. The consultant will carry out a multi-stage exercise in close collaboration with the ULB / State Government and other stakeholders. The proposed project has been taken up for improvement / introduction of Urban Infrastructure including ensuring delivery of services. Without limiting the scope, the PDMC has to work in close liaison with the Municipal Corporation / Council of the City / Urban Development Department of the State and will be responsible for the following tasks. The scope of service of PDMCs excludes the component of parks & development of open spaces.

The objective of treatment of sewage through a combination of physical, chemical and/or biological processes is to stabilize decomposable organic matter and remove other harmful contaminants prior to discharge onto a land or waterway or water body. The degree of treatment depends on the desired waste water quality.Raw sewage collected from household through a sewerage network is to be processed through a series of operations, so as to ensure its disposable quality suiting to the standards proposed by the pollution control board or regulatory authorities. The treatment of sewage can be stated under three stages. The primary treatment is the first stage of treatment where in all the physical matters are removed through screening, primary settling and through de-gritting. The secondary treatment removes all the biological matters through biological decomposition of degradable matters either through aerobic or anaerobic process or through combination of aerobic and anaerobic processes. The secondary treatment also comprises of sludge handling, management issues with disposal aspects. The tertiary Treatment process comprises of disinfection of treated sewage and its recycling proposals. There are many technologies available for treating the sewage to the desirable levels of its requirement for reuse. Some of treatment processes that have been adopted in India are discussed in the successive sections with their merits and demerits.

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II. LITERATURE REVIEW

Wastes from Water Treatment Plants This literature review on wastes from water treatment plants discusses previous literature reviews on the subject, sources and types of waste, characteristics of each type of waste, and waste management. The discussion of management of sludge (waste) covers minimizing sludge production, methods of sludge treatment, and ultimate sludge disposal.

Design and Types of STP Tanks

STP tanks can be categorized into various types, including, anaerobic, aerobic, and sequencing batch reactors (SBR). Each type serves specific purposes based on the nature of the wastewater and the desired treatment outcome.

1. Anaerobic Tanks: These systems are primarily used for high organic load wastewater. Studies indicate that anaerobic digestion significantly reduces sludge volume and produces biogas, which can be harnessed for energy.
2. Aerobic Tanks: Aerobic treatment processes are effective in removing soluble organic matter and nutrients. Research has shown that optimizing aeration can enhance treatment efficiency, with some studies suggesting that fine bubble diffusers yield better results than coarse ones.
3. Sequencing Batch Reactors (SBR): SBRs have gained popularity due to their flexibility and efficiency. Recent studies emphasize their ability to adapt to varying inflow rates and concentrations, making them suitable for decentralized wastewater treatment systems (Davis & Cornwell, 2021).

Operational Challenges

While STP tanks are essential, they face numerous operational challenges:

- Sludge Management: The accumulation of sludge can hinder treatment efficiency. Innovative techniques such as aerobic granulation and bio augmentation are being explored to enhance sludge handling.
- Nutrient Removal: Achieving optimal nitrogen and phosphorus removal remains a challenge. Advanced biological processes, including the use of denitrifying bacteria, have shown promise in improving nutrient removal rates.
- Odor Control: Odor emissions from STP tanks can cause public nuisance. Research into chemical and biological Odor control methods is ongoing, with studies highlighting the effectiveness of bio filters and activated carbon systems. Concurrently with the initial preparation of the report by the AWWA Research Foundation, the Water Resources Quality Control Committee of the Illinois Section of the AWWA conducted a survey of the handling of wastes from water treatment plants in Illinois. This effort was made to determine the type and quantities of waste produced, the characteristics of the wastes, and the existing methods of waste disposal in Illinois. In the AWWA Disposal of Water Treatment Plant Waste Committee published an updated report.

III. TERTIARY TREATMENT OF SEWAGE

Definition

Tertiary water treatment is the final stage of the multi-stage wastewater cleaning process. This third stage of treatment removes inorganic compounds, bacteria, viruses, and parasites. Removing these harmful substances makes the treated water safe to reuse, recycle, or release into the environment. To find out how tertiary sewage treatment works, take a look at this overview of the methods and processes involved in the tertiary treatment of wastewater.

Preparing Wastewater for Tertiary Sewage Treatment.

Before diving into the details of tertiary treatment of wastewater methods, let us very briefly review primary and secondary wastewater treatment. Primary treatment of wastewater involves filtering out large solid contaminants. Secondary treatment then purifies the wastewater through bio filtration, aeration, and oxidation. These are all processes that help to remove sediment from the water. The municipal water treatment solutions at AOS can help you execute the three stages of wastewater treatment. Through this responsible three-stage water treatment process, we protect both people and the natural environment from the harmful effects of untreated wastewater. Tertiary treatment of wastewater normally means final filtration of the treated effluent. When needed, it sometimes involves using alum to remove

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phosphorus particles from the water. Alum also causes any solids that were not removed by primary and secondary wastewater treatment to group so they can be removed by filters. When necessary, the filters are backwashed to remove the build-up of flock, which allows the filters to continue operating effectively.

Disinfection

An important part of wastewater treatment involves the addition of chlorine to the final effluent before discharge. This process injects chlorine into the headworks of a serpentine effluent detention chamber. Chlorination in wastewater treatment kills bacteria and viruses, and eliminates parasites such as Giardia and Cryptosporidium, which can cause very serious illnesses. In summary, this process disinfects water so that it is safe to reuse or recycle.

Dichlorination

The final stage of the tertiary wastewater treatment process involves removing the chlorine that was used to disinfect the water. This step is very important because chlorine is harmful to aquatic life. Chlorine also reduces biological water quality when it is present in high concentrations. To remove the chlorine, a compound called sodium bisulfide is added to the water. Chlorine ions in the water react with this chemical and are removed. Once the chlorine concentration has been reduced to a safe level, the treated water is now considered clean enough to be safely released into the environment

IV. CONCLUSION

It is expected: That the water treatment plant total removal reaches about 85% of Contaminants (DBO5, DQO y SST) and together with the tertiary System up to a 95%.

- Meat production increase
- Sub product production increase
- Better quality products
- Health concerns diminish
- Food security guaranteed and sustainability
- Contributions to cope with climate changes (aquifer recharge) and Treatment of residues
- Cattle farmers will strengthen their technological capacities as well as business and organizational
- Water will meet standards to be used in farm land
- Less volatile substances to produce safety concerns
- Project with few residues and cleaner production
- Employment generation.

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