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"Study Of Sewage Treatment Plant& Its Advancement With Innovative Approach"

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Abstract-A sewage treatment plant is quite necessary to receive the domestic and commercial waste and it helps to remove the materials which are harmful to general public. Its objective is to produce an environmentally safe fluid waste stream (or treated effluent) and a solid waste (or treated sludge) suitable for disposal or reuse (usually as a farm fertilizer).

A study on sewage domestic waste has been performed followed by permissible limits and characteristics of various parameters of the sewage like pH, temperature, BOD, COD, TSS, TDS, acidity, alkalinity, Ammonia, Phosphorus, and also heavy metals like Copper, Zinc, Lead , Calcium, Aluminum. Also a study of different and various Journal papers has been carried out for the general conclusion of the present condition and present practices going on to treat or to minimize the sewage. A site also has been visited which gave an idea about the origin, process overview and discharge of the sewage. It also gave an idea about the capacity of the Sewage treatment plant to treat the sewage per day.

Key Words :-Sewage Treatment Plant, Effluent, Permissible Limits, Parameters.

I. Introduction

Over the years, there has been continuous migration of people from rural and semi-urban areas to cities and towns. The proportion of population residing in urban areas has increased from 27.8% in 2001 to 31.80% in 2011. The number of towns has increased from 5,161 in 2001 to 7,935 in 2011. The uncontrolled growth in urban areas has left many Indian cities deficient in infrastructural services as water supply, sewerage treatment, storm water drainage, and solid waste management.

Most urban areas inhabited by slums in the country are plagued by acute problems related to indiscriminate disposal of sewage. Due to deficient efforts by town/city authorities, sewage and its management has become a tenacious problem and this is not withstanding the fact that the large part of the municipal expenditure is allotted to it. It is not uncommon to find that substantially a large portion of resources is being utilized on manning sewerage system by Urban Local Bodies (ULBs) for their operation and maintenance. Despite this, there has been a progressive decline in the standard of services with respect to collection, transportation, treatment and safe disposal of treated sewage as well as measures for ensuring safeguard of

public health & hygiene and environment. In many cities and towns in the country, a large quantity of sewage remains unattended giving rise to insanitary conditions in especially densely populated slums which in turn results in an increase in morbidity especially due to pathogens, parasitic infections and infestations in all segment of population.

Ii. Problem statement& necessity :-

If proper arrangements for the collection, treatment and disposal of all sewage produce from the town or city are not made, they will go on accumulating and create a foul condition.In addition to this disease, bacteria will bread up in the stagnate water and the health of the public will be in danger. Potable water will also get polluted. Total insanitary conditions will be developed in the town and it will become impossible for the public to live in the town or cities. Thus to keep the town or city healthy, clean also to treat and disposal water sanitation is very important. If sewage is not treated and disposed as it is then may lead following ill effects. Thus to prevent pollution and to maintain healthy environment as well as to remove

1. Inorganic matter e.g. sand and grit etc.

2.Toxic substance which may cause problems to

Aquatic life

3. Kill pathogenic organisms

4. To reduce the organic matter from sewage

Iii. Emerging trend & technologies:-

While the conventional sewerage may be a comprehensive system for sewage collection and transport, it also remains as a highly resource-intensive technology. Consequently, high capital cost, and significant O&M cost of this system inhibits its widespread adoption in all sizes of urban areas.

The implementation of Centralized Wastewater Management System (CWMS) should not be considered as the only option available for collection, transportation and treatment of sewage. There are certain factors which govern the selection of options between CWMS and Decentralized Wastewater Management System (DWMS). These have been elaborately discussed in relevant Chapter of the Manual, Decentralized wastewater management system (DWMS) may be designed as the collection, treatment, and disposal/reuse of sewage from individual houses, cluster of houses, isolated communities, industries or institutional facilities as well as from portion of existing communities at or near the point of generation of sewage. Decentralized systems maintain both the solids and liquid fraction, although the liquid portion and any residual solids can be transported to a centralized point for further treatment and reuse. Recognizing the many applications and benefits of sewage reuse, some important points may be kept in view such as (i) review of the impact of the population growth rate (ii) review of potential water reuse applications and water quality requirements (iii) review of appropriate technologies for sewage treatment and reuse (iv) considering the type of

management structure 395 that will be required in the future and (v) identification of issues that must be solved to bring about water reuse for sustainable development on a broad scale.

It has been emphasized that if the sewage from the urban and semi urban areas were reused for a variety of non-potable uses, the demand on the potable water supply would be reduced. The choice of appropriate technology will also depend on several factors such as composition of 400 sewage, availability of land, availability of funds and expertise. Different operation and maintenance options will have to be considered with respect to sustainable plant operation, the use of local resources, knowledge, and manpower.

Iii. Process overview

Sewage can be treated close to where it is created, a decentralized system (in septic tank, bio filters and aerobic treatment system) or be collected and transported by a network of pipes and pump stations to a municipal treatment plant, a centralized system (see sewerage pipes and infrastructure). Sewage collection and treatment is typically subjected to local, state and federal regulations standards .industrial source of sewage often required specialized treatment processes (see industrials sludge treatment). Sewage treatment generally involves three stages called primary, secondary and tertiary treatment.Primary treatment consists of temporarily holding the sewage in quiescent basin where heavy solid can settle to bottom while oil, grease and lighter solids float to the surface. The settled and floating materials are removed and the remaining liquid may be discharged or subjected to secondary treatment.

Secondary treatment removes dissolved and suspended biological matter. Secondary treatment is typically performed by indigenous, water-born micro¬organisms in a managed habitat .secondary treatment may require a separation process to remove the micro-organisms for the treated water prior to discharge or tertiary treatment. Tertiary treatment is some time defined as anything more than primary and secondary treatment in order to allow rejection into a highly sensitive or fragile ecosystem (estuaries, low-flow rivers oral reefs) treatment water is sometime disinfected chemically or physically (Ex. By lagoons and micro filtrations) prior to discharge into a stream, river, bay, lagoon or wetland, or it can be used for the irrigation of a golf course, green way or park. If it is sufficiently clean, it can also be used for ground water discharge or agriculture purposes.

Iv. Our findings

From various theoretical data and site visit we have collected important information regarding functions of various units of STP and their efficiency, standards of different parameters of sewage according to NEERI, WHO, CPCB & MPCB.

Table No.1 Unit operations/processes, their functions and devices used for domestic wastewater treatment (Table 10-1 of CPHEEO Manual)

Sr. No	Unit operations and Process	Functions	Treatment Devices

1	Screening	Removal of large floating, suspended and settle able solids	Bar racks and screens of various description
2	Grit removal	Removal of inorganic suspended solids	Grit chamber
3	Primary sedimentation	Removal of organic and inorganic settable solids	Primary sedimentation tank
4	A) Aerobic biological suspended growth process	Conversion of colloidal, dissolved and residual suspended organic matter into settable biotic and stable inorganics	Activated sludge process units and its modifications, waste stabilization Ponds. Aerated Lagoons.
	B) Aerobic biological attached growth process	Same as above	Trickling Filter. Rotating Biological Contactor

5	ANAEROBIC biological growth processes	Conversion of organic matter into CH_4& CO_3 and organic relatively stable organic residue	Anaerobic Filter, Bed Submerged Media Anaerobic Reactor, Up flow Anaerobic Sludge Blanket Reactor; Anaerobic Rotating Biological Contactor
6	Anaerobic stabilization of organic sludge.	Same as above	Anaerobic Digester

Table No.2.2 Expected efficiencies of various treatment units (Table 10-3 of CPHEEO Manual)

r. No.	Process	Percentage reduction		
		SS	BOD	Total coliform
1	Screening	-	-	-
2	Grit Removal	10-May	-	-
3	Primary Treatment (Sedimentation)	45-60	30-45	40-60
4	Chemical Treatment	60-80	45-65	60-90

5	Secondary Treatment (i) Standard trickling filters	 75-85	 70-90	 80-90
	(ii)High rate trickling fillers (a) single stage (b) Two stage	 75-85 90-95	 75-80 90-95	 80-90 90-60
	(iii) Activated sludge plants	85-90	85-95	90-96
	(iv) (a) Stabilization ponds (Single cell) (b) Stabilization ponds (Two Cells)	80-90 90-95	90-95 95-97	90-95 95-98

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