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DESIGN OF A SEWAGE TREATMENT PLANT FOR A LOCALITY IN BHOPAL TO RECYCLE THE LIQUID WASTE

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ABSTRACT

Sewage treatment is the process of removing contaminants from wastewater and household sewage, both runoff (effluents) and domestic. It includes physical, chemical, and biological processes to remove physical, chemical and biological contaminants. Its objective is to produce a treated effluent and a solid waste or sludge suitable for discharge or reuse back into the environment. This material is often inadvertently contaminated with many toxic organic and inorganic compounds.

In this research work I will design a sewage treatment plant for a locality (Kohefiza) in Bhopal M.P. to settle down the liquid waste generated from houses which is generally disposed to water bodies without any proper treatment which is the cause of water pollution and effect our environment.

KEYWORDS: sewage plant, designing, population forecast, environment, water bodies.

I. INTRODUCTION

Sewage implies the collecting of wastewaters from occupied areas and conveying them to some point of disposal. The liquid wastes will require treatment before they are discharged into the water body or otherwise disposed of without endangering the public health or causing offensive conditions.

As the cities have grown, the more primitive method of excreta disposal have gain place to the water-carried sewerage system. Even in the small cities the greater safety of sewerage, its convenience, and freedom from nuisance have caused it to be adopted wherever finances permit.

II. OBJECTIVES

1. To design a sewage plant for a locality.
2. To provide sewage effeicient treatment plant to settle next 30 years waste.
3. To reduce environment impact due to sewage false disposal.
4. To settle waste hazarding water bodies near the locality.

Literature related to our research work

Caliberation the three subsystems. For testing of control strategies with model of Avedøre WWTP a benchmark system with a normal dry weather influent file and various disturbance tests were prepared. The standard control strategy used at the WWTP was simulated first for a validation. Variation for influent concentrations and flow rates were created using a random number generator; thus, 90 days of variable influent concentration data was created. In a successful phosphorous removal strategy also PHA (poly-hydroxy- alkanoate) content is taken into account; moreover, that was noticed to reduce need of precipitation chemical considerably **(Ingildsen et al., 2006).**

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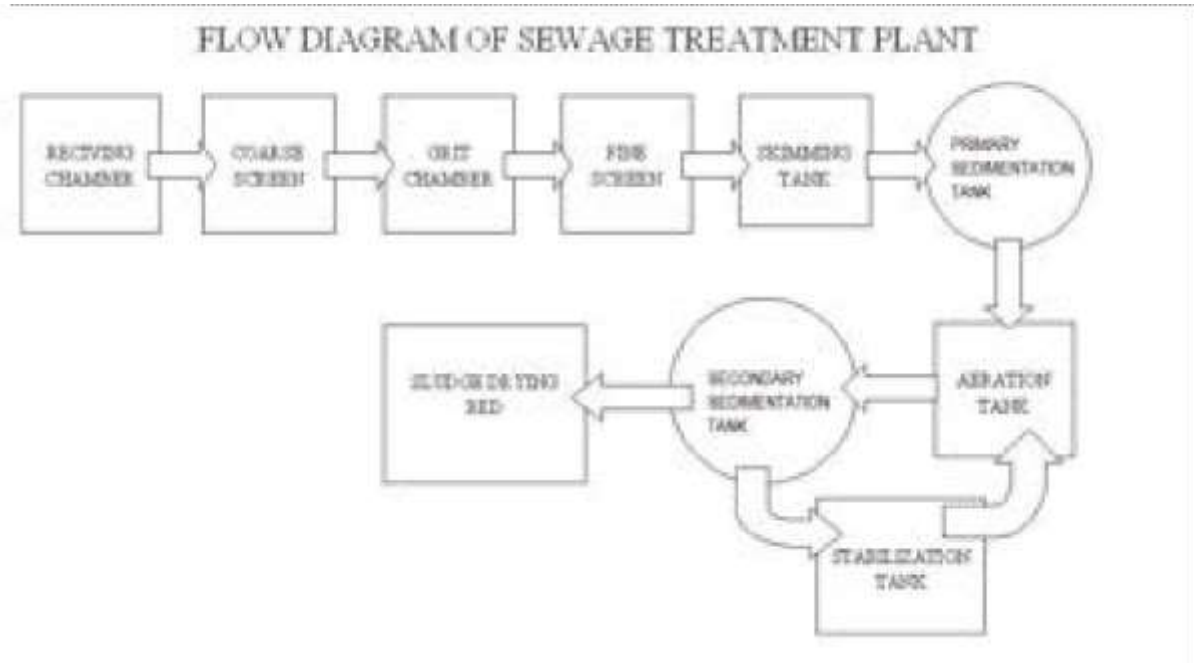
Three consulting teams conducted independent modelling projects at three different WWTPs in order to evaluate and optimise the plant operation; two in USA (Denver, 1,800,000 p.e. andUpper Marlboro, 250,000 p.e.) and one in Finland (Espoo, 250,000 p.e.) **(Phillips et al., 2009).**

III. METHODOLOGY

The main object of treatment units is to reduce the sewage contents (solids) from the sewage and remove all the nuisance causing elements and change the character of the sewage in such a way that it can be safely discharged in natural water course applied on the land. In other words, the objective of sewage treatment is to produce a disposable effluent without causing harm or trouble to the communities and prevent pollution. Practically the treatment of sewage is required in big cities only where the volume of the sewage is more as well as the quantity of various types of solid, industrial sewage etc. is more and porous land or large quantity of water bodies is not available for the proper disposal of sewage.

The following point should be kept in mind while giving layout of any sewage treatment plant:

- All the plant should be located in the order of sequence, so that sewage from one process should directly go to other process.
- If possible all the plant should be located at such elevation that sewage can flow from one plant into next under its force of gravity only.
- All the treatment units should be arranged in such a way that minimum area is required it will also ensure economy in its cost.
- Sufficient area should be occupied for future extension.
- Staff quarter and office also should be provided near the treatment plant, so that operators can watch the plant easily.
- The site of treatment plant should be very neat and give very good appearance.
- Bypass and overflow weir should be provided to cut out of operation any unit when required.
- All channels, conduits should be laid in such a way as to obtain flexibility, convenience and economy in the operation



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IV. PROBLEM FORMULATION

Following points are considered during the design of sewage treatment unit:

- The design period should be taken between 25 to 30 years.
- The design should not be done on the hourly sewage flow basis, but the average domestic flow plus the maximum industrial flow on the yearly record basis.
- Instead of providing one big unit for each treatment more than two numbers small units should provided, which will provide in operation as well as no stoppage during maintenance and repair of the plant.
- Overflow weirs and the bypasses should be provided to cut the particular operation if desired.
- Self cleaning velocity should develop at every place and stage.
- The design of the treatment units should be economical; easy in maintenance should offer flexibility in operation.

V. RESULTS ANALYSIS

SR. NO	Characteristics	Tolerance limit as per IS: 3307-1986	Effluent from the plant
1	pH	5.5-9.0	5.5-9.0
2	BOD	100 mg/l	<20 mg/l
3	Suspended solids	200 mg/l	<30 mg/l
4	Oil & Grease	10 mg/l	< 5 mg/l
5	Chlorides	600 mg/l	<400 mg/l
6	Sulphate	1000 mg/l	<250 mg/l

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Sr No.	ATTIBUTE	DATA
1	Project	Sewage Treatment Plant for Koh-E-Fiza & Lalghati
2	Sewage type	Partially Separate Sewerage System
3	Population census	
1963		64607
1973		70225
1983		75510
1993		80920
2003		87210
4	Method of Forecasting	Geometric Increase Method
5	Design Populaton	

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Base year-2013		91190
Intermediate-2033		103042
Ultimate year-2043		119142
6	Per Capita Water Supply	140 lpcd
7	Existing Sewerage system	Nil

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PLANT DETAILS			
COMPONENT	**TYPE**	**NOs.**	**DIMENSIONS**
Receiving chamber		1	6.2m X 2.1m X 2m (SWD) + 0.5m (FB)
Coarse Screen	1 manual 2 Mechanical	2	1.0m X 0.7m (SWD) + 0.5m (FB)
Grit Chamber	Horizontal Flow Type	2	5.7 m x 4.0 m x 2.0 m
Fine Screen	Disc Type Mechanical	2	1.45m X 0.8m (SWD) + 0.5m (FB)
Skimming Tank	Air Diffuser + Chlorine gas	1	1.0m X 0.65m X 3m (SWD) + 0.5m (FB)
Secondary Sedimentation Tank	Circular type Radial flow	1	27.3m (dia) X 3.0m (depth) + 0.5m (FB)
Oxidation Pond	Rectangular	1	296 m x 148 m x 3 m
Sludge Drying Bed	Sand+ Graded Gravel	4	12.5 m x 8 m

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VI. CONCLUSION

A successful technical project involves integration of various fields. This is an attempt to combine several aspects of environmental, biological and chemical and civil engineering.

Since, in Bhopal Municipal Corporation there is no proper treatment plant for sewage, it is necessary to construct a Sewage Treatment Plant. The plant is designed perfectly to meet the future expansion for the next 30 years in accordance with Indian Codal provisions. This project consists the design of the complete components of a Sewage Treatment Plant from receiving chamber, screening chamber, grit chamber, skimming tank, sedimentation tank, Oxidation tank and sludge drying beds for sewage

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