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Study on Sewage Quality from Sewage Treatment Plant at Salim Ali Lake, Aurangabad (MS)

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***Abstract*— A case study was conducted on sewage treatment plant at Salim ali lake which lies on kham river basin. This study consisted of multiple plant visits and discussion with the managing employees at the plant. During this period working of plant was studied along with the management tasks and difficulties. The plant is small 5 MLD sewage treatment plant that discharges treated water in Salim Ali Lake on daily basis. The aim of this study is to evaluate the quality of effluent discharged from 5MLD STP at Salim Ali Lake in Aurangabad city. This STP takes domestic sewage and discharges treated effluent into the lake. Salim Ali Lake comprised a rare and rich biodiversity spot within the city that hosts almost 16 tree species, 11 shrub types, 8 climbers, 32 terrestrial herbaceous plants, 10 genera of algae, 12 species of aquatic herbs. It is also an bird conservation sanctuary, hence it is important to preserve and monitor the water quality of effluent being discharged in the sewage. The study showed that the water treatment facility is of required standard and plays an important role in conserving the ecological biodiversity of the sewage.**

Keywords*— Biochemical Oxygen Demand, Chemical Oxygen Demand, Total Suspended Solid, etc.

I. INTRODUCTION

The production of waste from human activities is unavoidable. A significant part of this waste will end up as wastewater. An understanding of the nature of waste-water is fundamental for the design of appropriate wastewater treatment plants and the selection of effective treatment technologies. The aim of wastewater treatment is to enable wastewater to be disposed safely, without being damage to public health and without polluting water bodies. Sewage is 99 % water carrying domestic wastes originating in kitchen, bathing, laundry, urine and night soil. The objective of sewage treatment is to meet the relevant discharge standards laid down by the CPCB.

Salim Ali Sarovar (lake) is located near Delhi Gate, opposite Himayat Bagh, Aurangabad. It is located in the northern part of the city. During the Mughal period it was known as Khiziri Talab. It has been renamed after the greatornithologist, naturalist Salim Ali and also known as birdman of India.[1] The office of Divisional Commissioner Aurangabad division is located near it, so is the collector's office of Aurangabad District.

Fig. 1. Salim Ali Lake

Salim Ali Lake is named after great ornithologist Dr. Salim Ali and also historical lake known as Abari Houd which is located near Delhi Gate Aurangabad. It is situated in the northern part of the city. During the Mughal period it was known as Khiziri Talab. Later on it has been renamed after the great ornithologist, naturalist Salim Ali and also known as birdman of India. Salim Ali Lake comprised a rare and rich biodiversity spot within the city that hosts almost 16 tree species, 11 shrub types, 8 climbers, 32 terrestrial herbaceous plants, 10 genera of algae, 12 species of aquatic herbs. The site is also enriched with 16 aquatic insects, molluscs and crustaceans, nine varieties of fish, 15 species reptiles, seven types of rodents and mammals and 102 types of insects.

Fig. 2. Laboratory at Salim Ali Lake STP

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II. WORKING OF PLANT

Raw sewage is received and then after being filtered through coarse screen it comes in raw sewage sump. From sewage sump effluent is pumped to a height in silting chamber then it is passed through fine screen them it passes through grit chamber. After grit chamber the effluent is allowed in Ctech basin, which is a sequence batch reactor (SBR). Thern the effluent is disinfected using chlorination and discharged in lake.

Structure of Treatment Plant:

A. Priliminary process:

Prilimnary process consists of pumping screening and grit removal. Initially the sewage is passed through coarse screen to remove paper and other large impuritites. Then effluent is pumped to a height to achieve a hydrolic head. Here the effluent is screened through fine filter to remove smaller impurities like plastic wafers. Then the effluent is passed through grit chamber where heavier particles like grit, soil, sand etc. are removed by settling out.

B. *Primary and secondary process:*

Here traditional primary process which usually consist of a unit operation is not adopted. Secondary process is used to remove soluble and colloidal organic matter after primary treatment. Here a Sequence Batch reactor or Cyclic Activated Sludge treatment is used, here it is refered as a Ctech basin. Such a reactor has a high efficiency of BOD removal, remnant BOD is usually less than 5mg/l.

C. Tertiary treatment:

Tertiary or advanced treatment includes all operations and processes used to remove the pollutants not removed in primary and secondary treatment. Here disinfection through chlorination is adopted.

From SBR due aerobic decomposition large quantity of sludge formation of takes place. This sludge is highly in organic content and can be used as fertilizer for soil in farming. Sludge is first collected in sump from where it is taken to centrifuges where they are dried using centrifuges.

Fig. 3. Reactor at STP of Salim Ali Lake

III. THE CYCLIC ACTIVATED SLUDGE TREATMENT PROCESS

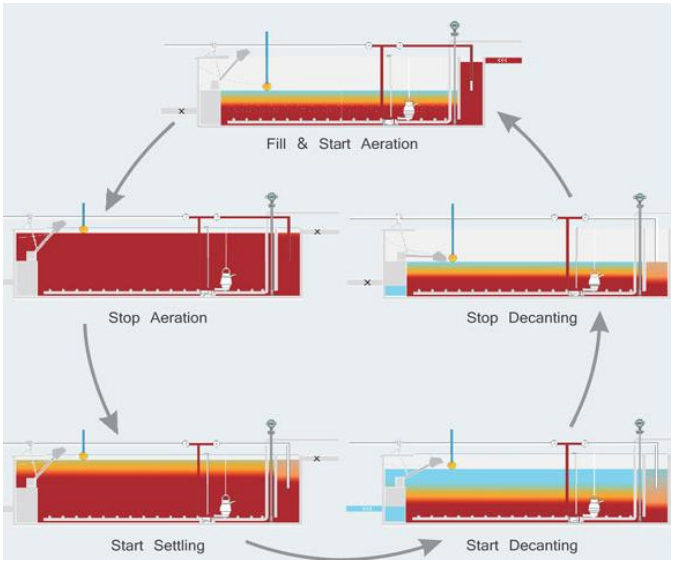

Fig. 4. Working of Cyclig Activated Sludge Process

Cyclic activated sludge treatment: System is operated in a batch reactor mode. The complete process takes place in a single reactor, within which all biological treatment steps take place sequentially. The complete biological operation is divided into cycles. Each cycle is of 3 – 5 hrs duration, during which all treatment steps take place. Fig. 4 Shows the cycles taking place in reactor and their order. Units

1. Fill-Aeration: The raw wastewater is filled in the C-Tech basin up to a set operating water level.
2. Aeration is done simultaneously for a pre-determined time to aerate the effluent along with the biomass.
3. Settlement: After the aeration cycle, the biomass settles under perfect settling conditions.
4. Decanting: Once settled the supernatant is removed from the top by using decanter. Solids are wasted from the tank during decanting phase.

These phases in a sequence constitute a cycle, which is then repeated.

IV. METHODOLOGY

Samples were collected from the influent and effluent of the sewage treatment plant. Collected samples were analysed for the important parameters Ph, BOD, COD, TSS etc. Samples were tested as quickly as possible after its collection. The results which are obtained after analysing samples from raw influent and treated effluent of STP are compared with standard parameter of MPCB.

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V. OBSERVATION AND RESULTS

Samples were collected during period of one month was tested in the laboratory for four wastewater quality parameter pH, BOD, COD, TDS, TSS.

As shown in table above the values of influent and effluent are described along with the permissible limits of effluent to be discharged in inland surface water bodies. This shows that that the effluent being discharged is well within the permissible limits, hence save for environment. As the inlet to the plant is simply domestic sewage which mainly comprises of organic waste it is save to assume that the above mentioned parameters are sufficient for analysing the effluent.

Table 1 Observations of Wastewater quality parameters taken at Inlet and Outlet.

Parameters / Dates		pH	TSS	TDS	COD	BOD
16/5/2015	Inlet	6.37	647	1320	660	320
	Outlet-1	7.30	10	-	27	6
	Outlet-2	7.28	11	-	24	5
2/6/2015	Inlet	6.38	656	1380	650	288
	Outlet-1	7.32	10	-	30	6
	Outlet-2	7.27	11	-	25	5
19/6/2015	Inlet	6.58	656	1240	660	280
	Outlet-1	7.02	10	-	28	6
	Outlet-2	7.27	12	-	25	6
MPCB Limits		5.5-9	<100	<2100	<250	<30

Fig. 5. Outlet of SBR reactor

VI. CONCLUSION

A supply of clean water is an essential requirement for the establishment and maintenance of diverse human activities. Water resources provide valuable food through aquatic life and irrigation for agriculture production. The results indicates all major waste water quality parameters were reduced to much extend after the treatment and treated effluent values were well within limit of discharge into lake as per MPCB. Hence it concludes that STP based on C-TECH Technology is working with the standards given by MPCB. The results obtained indicates this latest technology is very effective in wastewater treatment.

Thus the particular STP helps recuperating the water losses of the lake due to evaporation, evapotranspiration. By sustaining the water intake requirement of the lake it keeps the flora and fauna prosperous, thus maintaining the ecosystem.

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