

Performance Evaluation of 17MLD STP with Respect to Physico-Chemical and Biological Characteristics

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Abstract

The primary goal of treatment is to minimise or completely remove the pollutants present in sewage water. To meet regulatory environmental standards, an assessment of the efficacy of a sewage treatment facility's pollution reduction efforts was necessary. Wastewater re-use must follow rules and indications must be routinely checked and impended in order to protect the public's health, land and water supplies, and irrigation techniques. Requirements must therefore be given top importance throughout the stages of review and development. Chemical and biological methods were employed to regulate the removal efficiency of treatment facilities. This study evaluates and investigates the efficiency and functionality of Kolhapur's 17 MLD sewage treatment facility (STP). Water quality needs to be regularly monitored in wastewater treatment facilities. The current study will assist the treatment facility in its efforts to enhance the therapeutic procedure. One would be able to update the effluent efficiency standards based on seasonal oscillations in wastewater treatment as the evaluation explains the range of water quality indicators in waste water plants. The analytical data that were gathered make it much easier to identify, address, and manage plant operating and maintenance issues; these findings may be used when planning the future plant expansion to assure successful outcomes. The primary water quality indicators, including Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), and Biological Oxygen Demand (BOD), were measured in waste water samples that were collected at various phases of treatment units.

Keywords: Sewage Treatment, BOD, COD, TSS, O&G

1. INTRODUCTION

In addition to health risks associated with water usage, India faces many difficulties related to water and wastewater. Wastewater makes up over 80% of the water utilised in households. Normally, untreated wastewater is released into the environment, where it may dissolve into the ground and pollute groundwater, or it may enter the natural drainage system and poison places downstream. However, there are major environmental issues when such waste water is released into surface water or land. The current study aims to evaluate a waste water treatment facility's efficacy. As a case study, a sewage treatment plant is being examined.

Waste water samples were taken at different stages of treatment units, and the main water quality indicators, such as Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), and Biological Oxygen Demand

(BOD), were analysed in these samples. When such wastewaters are released without enough treatment, they cause significant harm to recipient water bodies and upset the entire ecosystem. In addition, the Indian government has strict guidelines & standards for wastewater discharge in place to protect the environment. Therefore, wastewater needs to be appropriately treated before being disposed of in order to meet the effluent discharge requirements.

Table no.1 Disposable Limit as per consent.

Parameters	Disposable limit as per consent
COD	100 mg/l
BOD	10 mg/l
pH	5.5 – 9.0
TSS	10 mg/l
Oil & Grease	10 mg/l

Current flow sheet of STP is given as fig no. 1

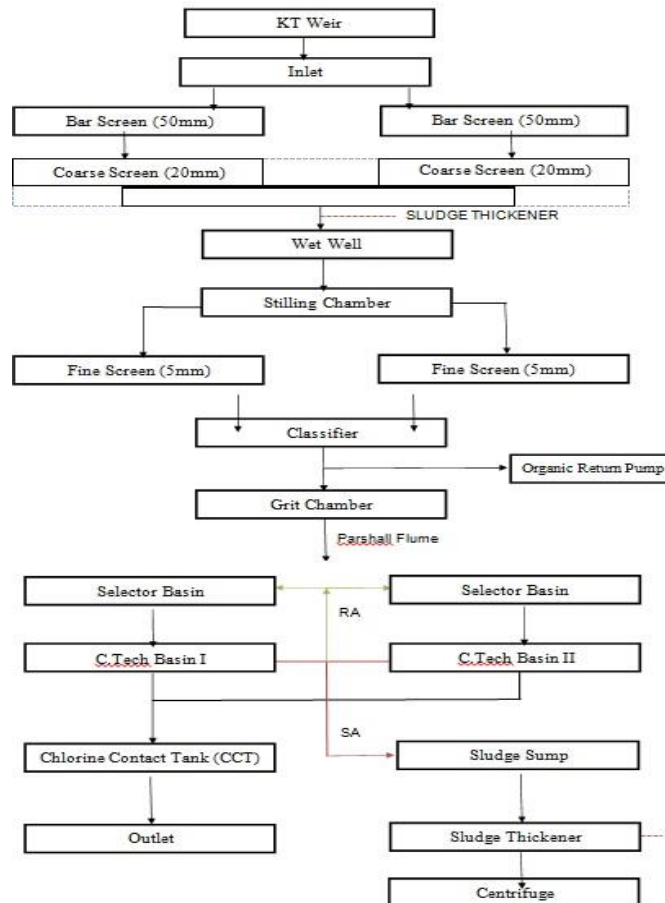


Fig. 1 : - Flow Sheet of STP

2. METHODOLOGY

The pre-treatment (RAW wastewater) and post-treatment phases of the wastewater sample collection were conducted. Every sample was examined in the plant's laboratory and examined for temperature, pH, TSS, COD, BOD, and oil and grease.

A pH electrode was used to assess each sample's pH, and a hot plate device was used to determine TSS. A COD digester was used to measure COD. A BOD incubator was used to measure the BOD content, and a separatory funnel was used to measure the oil and grease content.

3. RESULTS AND DISCUSSION

A. pH:

Before treatment, the pH of the effluent ranged from 7.12 to 7.32. After treatment, the pH value ranged from 7.14 to 7.46. The final treated effluent's average value was 7.34. This falls inside the allowable 9-limit.

B. COD:

Prior to treatment, the COD of the effluent ranged from 150 to 172. Following therapy, the COD value ranged from 10 to 16. The final treated effluent's average value was 12.2. This is within the 100 mg/l allowable limit.

C. BOD:

Prior to treatment, the effluent's BOD ranged from 52.2 to 58.6. The BOD treatment's value ranged from 4.22 to 5.0. The final treated effluent's average value was 4.43. This is under the 10 mg/l allowable limit.

D. TSS:

Prior to treatment, the effluent's TSS ranged from 62 to 72 mg/l. Following therapy, the TSS value ranged from 4 to 8 mg/l. The final treated effluent had an average concentration of 6.2 mg/l. which fell inside the 100 mg/l allowable range. A decrease in percentage of 77 to 82% was noted.

E. O&G:

The pre-treatment wastewater's O&G level ranged from 1.2 to 1.4 mg/l. The value after tertiary treatment, however, was found to be below the limit of detection. Thus, a 100% drop in percentage was noted.

The following Figures show comparison between Treated Effluent and MPCB standards

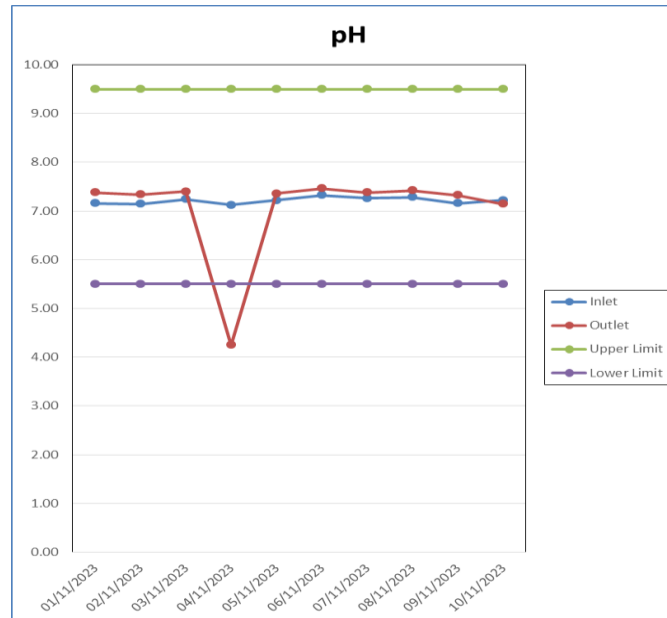


Fig. 2: pH value of Effluent

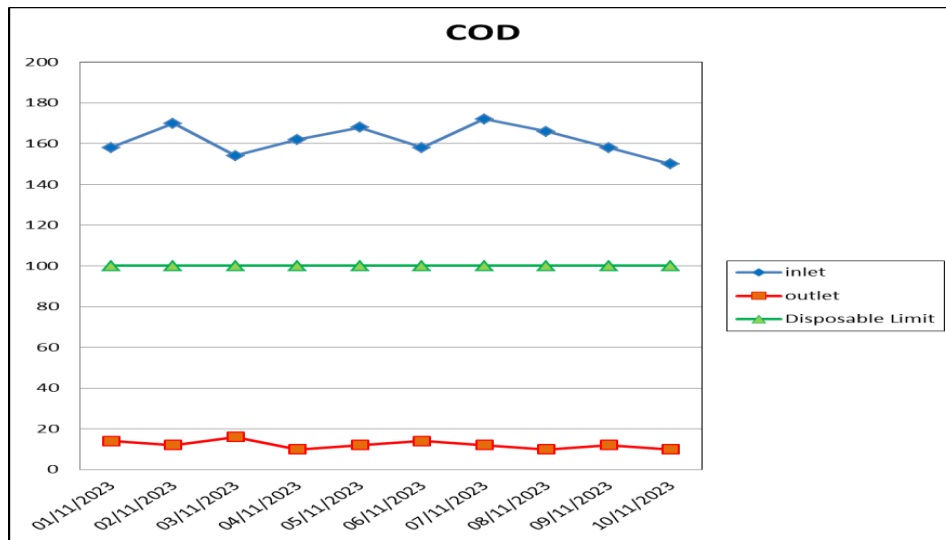


Fig. 3: COD value of Effluent

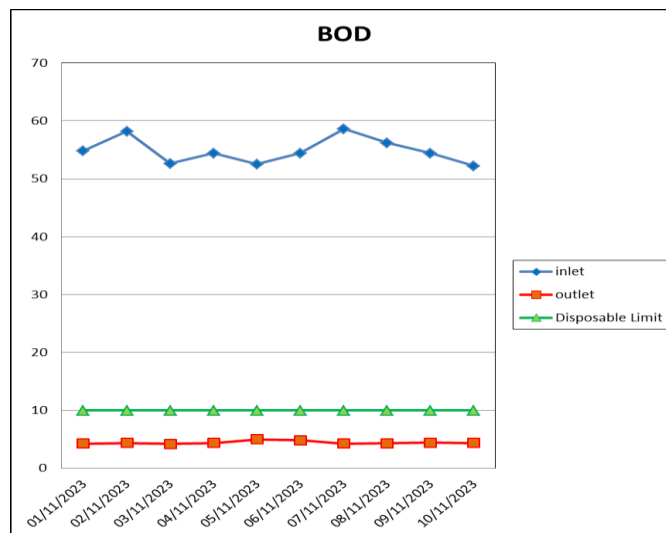


Fig. 4: BOD value of Effluent

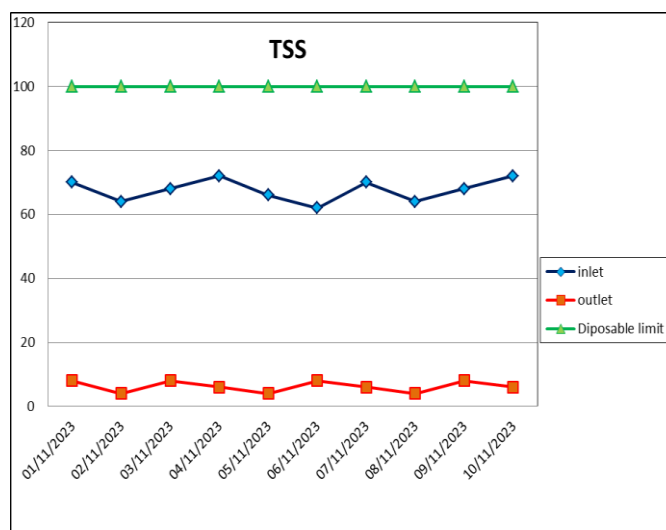


Fig. 5: TSS value of Effluent

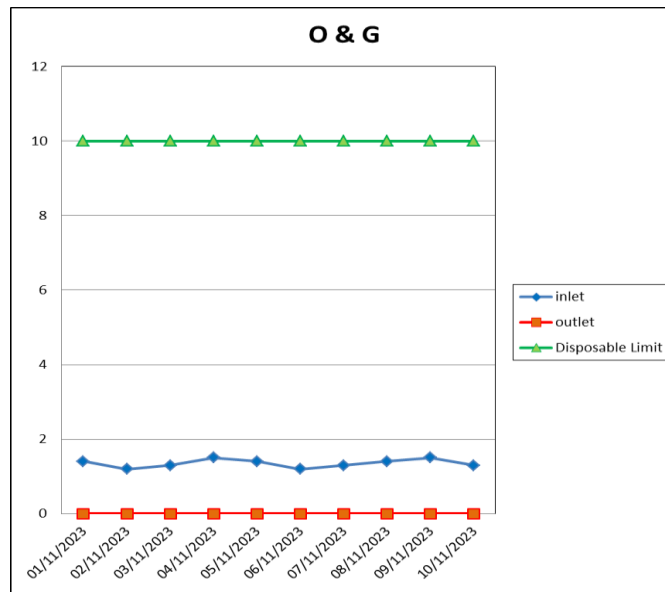


Fig. 6: O & G value of Effluent

Table no.2: Characteristics of STP wastewater

Parameter	Before Treatment	After treatment
pH	7.12 – 7.32	7.14 - 7.46
COD	150 mg/l – 172 mg/l	10 mg/l – 16 mg/l
BOD	52.2 mg/l - 58.6 mg/l	4.22 mg/l - 5.0 mg/l
TSS	62 mg/l – 72 mg/l	4 mg/l – 8 mg/l
Oil & Grease	1.2 mg/l – 1.4 mg/l	0 mg/l

Table no.3 Percentage Reduction

Parameter	Avg. value at Inlet	Avg. value at outlet	% Reduction
pH	7.212	7.345	
COD	161.6	12.2	92.00%
BOD	54.83	4.434	92.00%
TSS	67.6	6.2	91.00%
O&G	1.35	0	100%

4. CONCLUSION

The evaluation of STP's performance in terms of its physico-chemical and biological properties is the focus of this study. Based on the analysis's findings, it was determined that, for all criteria examined in this study, the sewage treatment plant's overall performance was satisfactory and that the treated water satisfied the required

discharge limit. In terms of pH, BOD, COD, TSS, and oil and grease, the average removal effectiveness was 92%, 92%, 91%, and 100%, respectively.

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