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Review on Water Treatment Plant

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Abstract- The purification of waste water from various industrial processes is a world wide problem of increasing importance due to the restricted amounts of water suitable for direct use, the high price of the purification and the necessity of utilizing the waste products. Maintaining the drinking water quality is essential to public health. Although various water treatments is a common practice for supplying good quality of water from a source of water, maintaining an adequate water quality throughout a distribution system has never been an easy task.

Index Terms- ***WTP, MJP, MLD***

1. INTRODUCTION

The supply of clean water is essential requirement for the establishment and maintenance of diverse human activities. Water resources provide valuable food through irrigation for agriculture production and aquatic life. However, solid and liquid wastes produced by human settlements and industrial activities pollute most of the water sources throughout the world.

In Maharashtra, one major implementing agency belonging to Government of Maharashtra is currently responsible for rural as well as urban water supply schemes. The Maharashtra water supply and Board constituted on 1st Jan, 1997under Maharashtra water supply sewage board Act 1976, for rapid development and proper regulation of water supply and sewage service in the state. This was changed as Maharashtra Jeevan Pradhikaran with effect from 10th March, 1997.

This plant is situated on Yelgaon dam having storage capacity 1.24*10^9 cubic meter. This helps us to improve the quality and quantity of water required for Buldana city.

1.1 The salient features of water treatment plant of Yelgaon Dist. Buldana

1.	Controlling Agency	MJP BULDANA
2.	Year of completion of WTP	
3.	Design Capacity	19.5 MLD
4.	Design population	67430 (2011 census)
5.	No. of tap connection	12678
6.	Design period	25 Yrs
7.	Electricity available at Pump house	24 Hrs
8.	Electricity available at W.T.P.	20 Hrs

1.2 Objective and Scope

Objectives of this study are :

- To assess the existing performance levels of water treatment plant in regard to:
  - ✓ Its ability to produce good quality water and control pathogens
  - ✓ Effect of design, operation and administration on treatment performance
  - ✓ Effectiveness of monitoring and technical survey
- To address performance limiting factors
- To identify feasible short and long term water treatment solutions of existing water treatment plant.
  - ✓ Short term, low capital improvements that could be made to improve performance.
  - ✓ Long term improvements to improve water quality and plant operation.
- To monitor and evaluate the supplied water quality of water supply system.

Scope :

This study proposes to investigate the practicalities, focusing on critical stages of treatment, and identify key factors that contribute to the treatment performance of water treatment plant. A considered amount of laboratory analysis work is necessary to assess the treatment performance and limiting factors.

1.3 Plant under study :

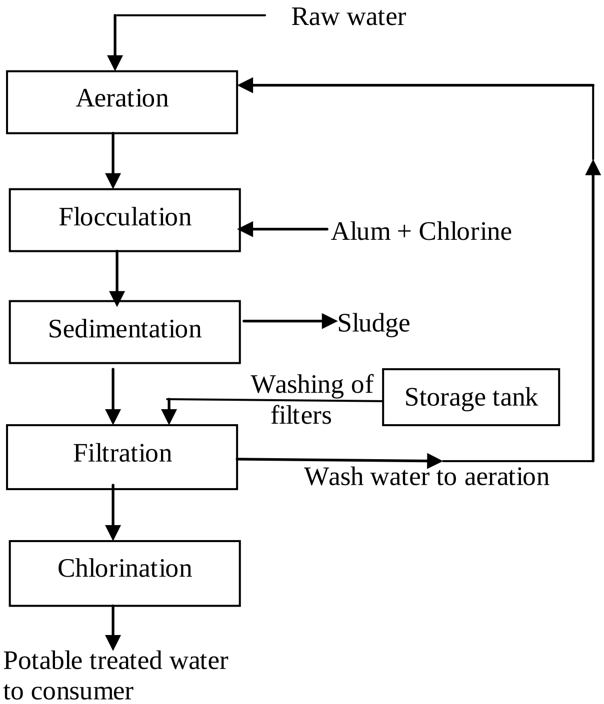
The treatment plant has been provided for the treatment of raw water received from Yelgaon dam, for the filtered water supply to habitat of the township. The treatment plant under description is provided to produce treated water quality for the purpose of human consumption as per recommendation for drinking water norms.

WATER CHARACTERISTICS

1. Raw water characteristics	
Flow (m3/d)	
-Normal	<35
-During monsoon	Upto5000
2. Treated water characteristics	
pH	7-8.5
Turbidity	
-Settled water	10-20
-filtrate	< 1
Colour (Pt. Cobalt scale)	3
Iron, as Fe (mg/L)	0.1 – 0.3
Nitrites	Nil
Coli from count (MPN/100ml)	-E-coli count zero in any sample

1.4 The complete scheme is detailed in the process flow diagram:

Flow chart for water treatment plant



1.5 Unit description :

The process details of various treatment/ auxiliary units provided in the water treatment plant are as under :

1. Aeration fountain	01
2. Par shall flume	01
3. flash mixer	01
4. Clariflocculator	01
5. Rapid gravity sand filter	06
6. Wash water tank & pumps	01
7. PW sump and Pump House	Flow (m3/d) – 10250
8. Recirculation sump & Pumps	03 (02w + 01s)
9. Chemical House	Double story

Chemical Dosing System –

1. Chlorination System	
Dosing rates (ppm)	04
No. of chlorinators	02 (1+1)
Type	Gravity feed
2. Alum solution dosing system	
Dosing rate (mg/L)	80
Numbers	02
Type of mixer	Single drive with common shaft and individual agitator

2. LITERATURE REVIEW

In 2007, Mahdi, et al., conducted a combined anaerobic-aerobic system for treatment of textile wastewater. Textile manufacturing consumes a considerable amount of water in its manufacturing processes. The water is primarily utilized in the dyeing and finishing operations of the textile establishments. Considering both the volume generated and the effluent composition, the textile industry wastewater is rated as the most polluting among all industrial sectors. In their study, a combined anaerobic-aerobic reactor was operated continuously for treatment of textile wastewater. Cosmo balls were used to function as growth media for microorganisms in anaerobic reactor. Effect of pH, dissolved oxygen, and organic changes in nitrification and denatrification process were investigated. The results indicated that over 84.62% ammonia nitrogen and about 98.9% volatile suspended solid (VSS) removal efficiency could be obtained. Dissolved oxygen (DO), pH were shown to have only slight influences on the nitrification process; and for each

10% removal of nitrogen, only 3% of pH changes were achieved. Instrumentation A laboratory scale combined anaerobic-aerobic reactor was set up to investigate the effectiveness of the system to treat textile wastewater in term of nitrogen removal. Anaerobic reactor The anaerobic reactor, made of transparent PVC, has a diameter of 30 cm, height of 30 cm, and total working volume of 18 litres. The reactor was filled up with supporting particles (Cosmo ball) for immobilization of microorganism in the system, and a total of 2-liter active sludge from palm oil mill was collected from Hulu Langat, Malaysia and fed into the reactor. The total surface area of support material was 192.56m2.

Florante et. al., in 2009 conducted a preliminary study on nitrogen and organic removal efficiency of a lab-scale system using aerobic and an-aerobic reactors. A simulated wastewater containing elevated levels of nitrogen was used. This paper aims to compare the efficiency of aerobic and anaerobic reactors in achieving nitrogen and chemical oxygen demand (COD) removal of nutrient-rich wastewater. It also presents the start-up experi-mentation conducted on simulated wastewater using two different reactors configured as aerobic and anaero-bic. Start-up experiments were carried out using a 5-liter acrylic aerobic reactor and a 4-liter flask anaerobic reactor containing activated sludge taken from De La Salle University (DLSU) wastewater treatment plant as a source of inoculum. Simulated wastewater was continuously fed to the two reactors and the time course of biomass growth was monitored by measuring the biomass concentration represented by mixed liquor volatile solids (MLVS). The time course of organic pollutant reduction by measuring the chemical oxygen demand (COD) was conducted until steady state condition was reached. On the other hand, COD and nitrogen tests such as Ammonia nitrogen (NH3-N), Nitrite nitrogen (NO2--N), Nitrate nitrogen (NO3--N) were also per-formed using 5 batch aerobic reactors containing different concentrations of wastewater and a single batch anaerobic reactor to see the effect of different feed concentrations in the removal of nitrogen. Preliminary results showed that 98% reduction in COD was obtained in aerobic reactor, as supported by increasing con-centration of MLVS, with a hydraulic retention time (HRT) of 5 10 | P a g e hours after 11 days while 34% reduction in COD was obtained in anaerobic reactor with the same HRT after 14 days.

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