

**INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH
TECHNOLOGY****PERFORMANCE EVALUATION OF WATER TREATMENT UNITS AT
BHADRAVATHI, KARNATAKA: A CASE STUDY****Meghana M^{*1}, Manjunath N T²**^{*1} Student, M.Tech (EnvEngg), University BDT College of Engineering, Davangere, India.² Professor and Director, Centre for Env. Sci. Engg. and Tech., University BDT College of Engineering, Davangere, India.

DOI: 10.5281/zenodo.834622

ABSTRACT

The need of the day is sustainable supply of portable water for human consumption so that health and wellbeing of the community can be addressed. Furthermore treating of the polluted water and making it safe for drinking and domestic use is the main challenge for the world today. However proper design and commissioning of treatment plants only may not ensure its proper functioning but it requires frequent evaluation of performance of various units of treatment plant. Skilful plant operation and attention to the requirements of the sources of supply and distribution system are equally important to guarantee safe drinking water supply. In this paper an attempt has been made to take stalk of performance evaluation of various water treatment units. The study revealed that treatment units are functioning satisfactorily and treated water is meeting drinking water quality standards prescribed by BIS. The work is an outcome of M.Tech dissertation.

KEYWORDS: Pollution, treatment, performance evaluation, BIS water quality standards**I. INTRODUCTION**

Water is indispensable in the maintenance of life on earth. But our society continues to pollute this valuable resource. The pollution is attributed to industrialisation, urbanisation, population explosion etc. Insecure drinking water contributes to several health problems.

Thus the need of the day is the water should be purified and made safer for the consumption. Hence water treatment plants play a vital role in accomplishing this. Designing and commissioning of treatment plants may not serve the absolute purpose of treating and supplying of wholesome water. But to produce water quality of required standards, study of water treatment plant on regular basis to determine its efficiency is a must.

In this background for M.Tech dissertation it was thought off to carry out studies to assess the performance of water treatment plant and to suggest remedial measures if required. The outcomes of the study are documented in this paper.

II. LITERATURE REVIEW

Various researchers across the globe carried out studies and published papers related to performance assessment of treatment plants. The review of literature revealed that the performance evaluation of treatment plants is a unique and is specific to particular plant. **Zahra, et.al (2016)** investigated performance evaluation of Qom treatment plant to remove turbidity and coliform. The studies revealed that the mean values of turbidity and coliforms confirmed that the quality of treated water corresponded with the national Iranian standards and hence treatment system is functioning well. **Manoj, et.al (2013)** carried out research on the method and criteria used for the performance evaluation of conventional water treatment plant and its findings. The results obtained shown the increase in the DO and decrease in the acidity of water and thus confirms proper working of aeration. But in case of high turbid water, the clariflocculator and filtration were failed to produce permissible limits. **Madhu and Soumyashree (2016)** from their studies on performance of water treatment plant concluded that raw water was less turbid and odorless due to summer, and after treatment it is found to be within limits of drinking standards. **Hussein and Adnan (2014)** studied the performance evaluation of Al-Karkh water treatment plant in Baghdad City. The 1-day average turbidity data of supplied water showed that the WTP was

[Meghana* *et al.*, 6(7): July, 2017]ICTTM Value: 3.00

(2%) violate with the Iraqi and WHO standards, 2-day average turbidity data was 99% compliance with the USEPA and 30-day average turbidity result was 32% compliance with the USEPA.

III. MATERIALS AND METHODS

The treatment unit considered for study consists of intake (RW: River water), mixing chamber, settling tank (SST), filtration unit (SFU) and disinfection unit (SCI). The grab samples were collected from the exit points of these units once in a month for the August to November 2016. Thus the samples collected were preserved and analyzed employing the procedure given in standard method (AWWA: 2006). The physical, chemical and bacteriological parameters are considered for study includes pH, hardness, chlorides, total solids, total suspended solids, BOD and MPN.

IV. RESULTS AND DISCUSSION

The characteristics of the raw water collected during the different months of study period and the characteristics of treated water from the various treatment units are shown with respect to total solids, hardness, chlorides are shown in figures 1, 2 and 3. Overall efficiency of the treatment systems and characteristics of treated water during the various months of study period are shown in table 1.

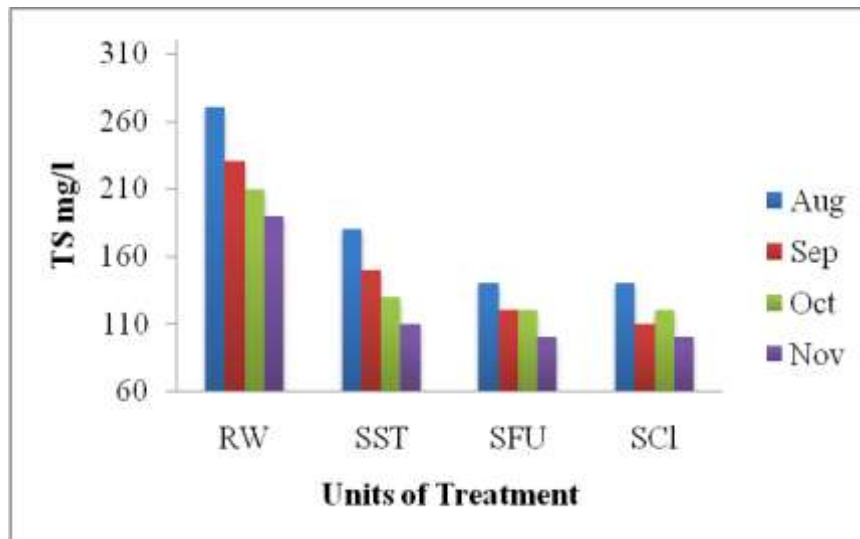


Fig 1: TS Concentration measured at various sampling points

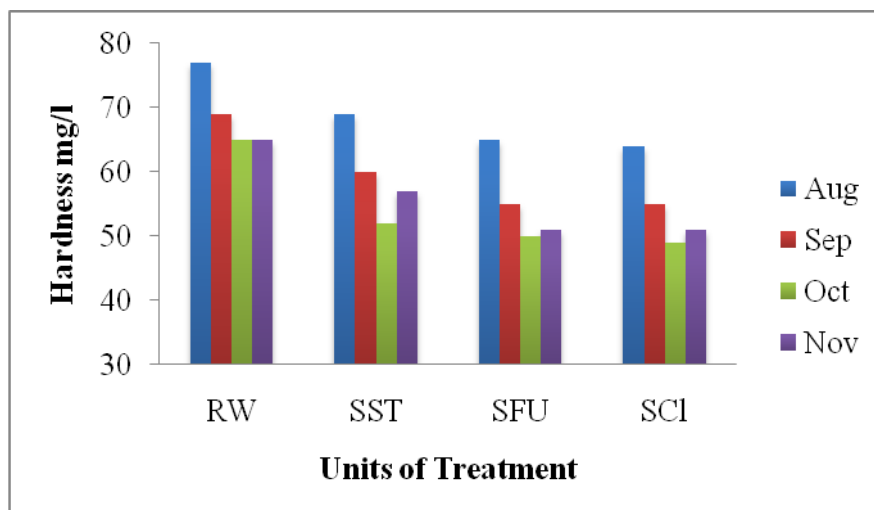


Fig 2: Hardness Concentration Measured at Various Sampling Points

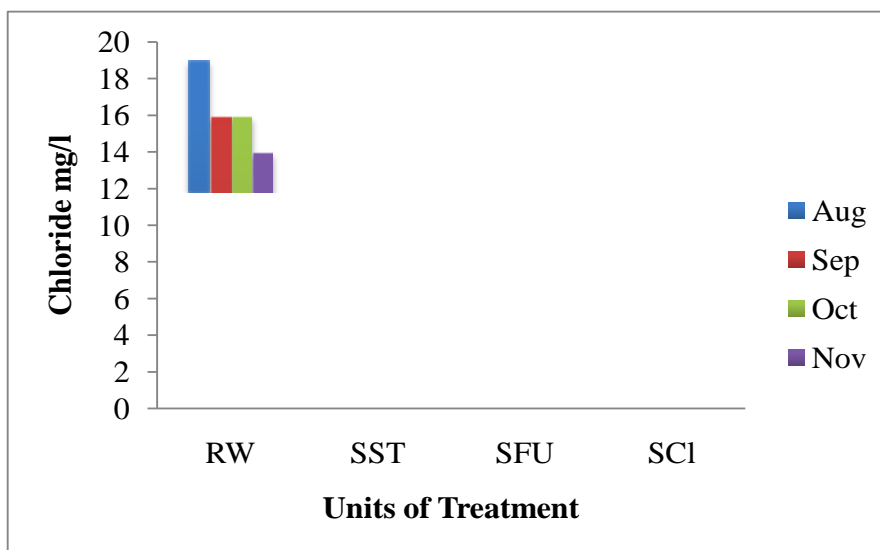


Fig 3. Chloride Concentration Measured at Various Sampling Points

Table 1. Overall Efficiency of Treatment System

Parameters	Month of Study Period											
	August			September			October			November		
	Characteristics		Overall Efficiency (%)	Characteristics		Overall Efficiency (%)	Characteristics		Overall Efficiency (%)	Characteristics		Overall Efficiency (%)
	Raw water	Treated water		Raw water	Treated water		Raw water	Treated water		Raw water	Treated water	
Total Solids, mg/l	270	140	48	230	110	52	210	120	43	190	100	47
Hardness, mg/l	77	64	17	69	55	20	65	49	25	65	51	22
Chloride, mg/l	19	8	58	16	9	44	16	10	38	14	9	36
BOD, mg/l	4	0.4	90	3	0.3	90	0	0	0	3	0	100
MPN / 100ml	1100	0	100	150	0	100	0	0	0	240	0	100

Based on the results of studies shown in graphs and tables and analysis of the same the following inferences have been drawn.

- Based on percentage removal efficiency of various units it is inferred that, the units are functioning well.
- Based on treated water characteristics it is inferred that, the treated water is satisfying the water quality standards set by BIS (2012).
- It is inferred that, the sizes of the existing treatment units are as per treatment standard design requirements.
- It is inferred that the trickling filter units are able to remove BOD ranging between 90 to 100 %.
- It is inferred that the settling tanks are efficient to remove TSS in the range of 80 to 90 %.

- It is inferred that the line and degree of treatment employed at present are efficient to remove (overall) 100 %, 100 % and 90 % of BOD, MPN and TSS respectively.

V. CONCLUSION

The analysis of results with respect to performance of individual treatment units and characteristic of the treated water lead to the conclusion that various treatment units considered for study are working satisfactorily and sizes of the units are in confirmation with standard design criteria. However continuous maintenance and monitoring of treatment units is suggested.

VI. REFERENCES

- [1] Punmia B .C, Ashok K Jain and Arun K Jain, Water Supply Engineering, Text Pub- Laxmi Publication Private Limited, New Delhi, 1999.
- [2] Zahra Ahmadia, Mohammad Fahiminiab, Shahram Arsang Jangc, Reza Ansarid, Maryam Savadkouhia, Azita Anbaza and Akbar Escandari , “Performance Evaluation of Qom Water Treatment of Plant During 2005 to 2014, Iran”, ARCHIVES OF HYGIENE SCIENCES, Vol.6, No.1 , pp.58-65, 2016.
- [3] Manoj H. Mota, Shashiraj S.Chougule and Yogesh S Vatkar, “Performance Evaluation of Urban Water Treatment Plant”, INTERNATIONAL JOURNAL OF SCIENCE AND RESEARCH, Vol.4, Issue.4, pp.2821-2825, 2013.
- [4] Madhu K.M and Soumyashree S.H, “Performance Evaluation of a Water Treatment Plant at Davangere-(Karnataka)”, INTERNATIONAL RESEARCH JOURNAL OF ENGINEERING AND TECHNOLOGY, Vol.3. No.9, pp.1467-1468, 2016.
- [5] Hussein Janna and Adnan A. Al-Samawi, “Performance Evaluation of Al- Karkh Water Treatment Plant in the City of Baghdad” INTERNATIONAL JOURNAL OF ADVANCED RESEARCH, Vol.2 , Issue.10, pp. 823-829, 2014.
- [6] AWWA, Standard Methods for the Examination of Water and Wastewater. Washington: American Public Health Association, 2006.

CITE AN ARTICLE

M, Meghana , and Manjunath N. T. "PERFORMANCE EVALUATION OF WATER TREATMENT UNITS AT BHADRAVATHI, KARNATAKA: A CASE STUDY." INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY 6.7 (2017): 928-31. Web. 25 July 2017.