PERFORMANCE EVALUATION OF COMMON EFFLUENT TREATMENT PLANT - TEXTILE INDUSTRIES

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ABSTRACT

The study focuses on performance evaluation of a common effluent treatment plant (C.E.T.P) receiving the waste water from Textile Industries.Small-scale industries (SSIs) have a very important role in overall industrial development in India. Quantity of waste generated by individual SSIs may not be large, but combined effect of operation of a large number of SSIs units on the environment can be high. Textile industries are small scale industries generating waste water in large quantity. Thus CETP is required for better treatment of generated waste water from textile industry. Thus a common effluent treatment plant offers an alternative to the practice of better utilization of resources of an industrial area. The monitoring and performance evaluation studies were carried out for an effluent treatment plant of a common effluent treatment plant at Surat.

Keywords: **Common Effluent Treatment Plant, CETP, Performance Evaluation.**

I INTRODUCTION

Small-scale industries (SSIs) have a very important role in overall industrial development in India. Around 300,000 SSIs units spread all over India. SSIs contribute 40% of the total industrial output of the country, But generate over 44% of the hazardous wastes while contribution by the large-scale industry is 13%. Quantity of waste generated by individual SSIs may not be large, but combined effect of operation of a large number of SSIs units on the environment can be high. Concept of CETP was originally promoted by the Ministry of Environment and Forests (MOEF) in 1984. The scheme promoted common facilities for treatment of effluents generated from SSI units. The CETP scheme was instituted initially for a period of 10 years. Further MOEF has decided to continue for financial assistance to SSIs. Central Pollution Control Board has studied performance of 78 CETPs operating throughout the country.

II NEED OF THE STUDY

It is difficult for each industrial unit to provide and operate individual wastewater treatment plant because of lack of space availability, manpower and cost. So Common Effluent Treatment Plant (CETP) promoted by the Ministry of Environment and Forests (MOEF) in 1984. In the present study Performance evaluation of the CETPs provided for the treatment of effluent generated by small-scale textile and chemical industries located at Surat (Gujarat).

III. AIM AND OBJECTIVE OF THE STUDY

The aim of this study is to evaluate the performance efficiency of effluent treatment facility and lab scale research to reduce pollutant loads through adoption of recent developments in the areas of effluent management systems. The objectives are to review the literatures available, to understand the various types of industrial

units other than textile sector units contributing wastewater to the CETP. To check the performance of all the constituent facilities of the CETP. To check the performance of the design and assessment of the capacity. To evaluate integrated performance of common effluent treatment plant for parameters like SS and COD by studying influent and effluent characteristics of the plant.

IV. METHODOLOGY

V. Common Effluent Treatment Plant (CETP)

The Present study has been undertaken to evaluate performance efficiency of a CETP located at Surat (Gujarat).The CETP is operating with an average wastewater inflow of 85 MLD. The CETP has been designed for 100 MLD.It has been considered for case study, the effluent is coming from Small Scale Industries engaged in textile dyeing and printing while few chemical manufacturing units. The effluent is conveyed through underground drainage conveyance system to the inlet of collection sump of effluent pumping system. Treated effluent of the CETP is disposed into the Bhedwad Khadi.

VI. PERFOMANCE EVALUATION

Sample was collected from the three sampling locations i.e. from the influent, Primary Clarifier Outlet and Final outlet of the plant. Before collection of samples containers were rinsed with the samples being collected. Composite type sampling technique was used to collect the samples. Collected samples were analyzed for the parameters pH, BOD, COD, TSS, TDS and Ammonical Nitrogen. As possible samples were analyzed on the same day whenever it was possible; otherwise these samples were preserved at 4°C. Analysis was done in the laboratory by determining various parameters according to “standards methods for examination of water and waste water”.

Sampling Location : Inlet (All Unit- mg/l, pH on pH scale)

pH	TSS	TDS	COD	BOD	NH_4N	O&G
7.31	1398	14030	1492	497	22.12	60

Sampling Location : SBC-1 (Primary Outlet) (All Unit- mg/l, pH on pH scale)

pH	TSS	TDS	COD	BOD
7.54	619	14230	1132	377

Sampling Location : SBC-2 (Primary Outlet) (All Unit- mg/l, pH on pH scale)

pH	TSS	TDS	COD	BOD
7.33	601	13160	1098	366

Sampling Location : Final Discharge (All Unit- mg/l, pH on pH scale)

pH	TSS	TDS	COD	BOD	NH_4N	O&G
7.50	1039	12160	501	167	13.72	19

- **It is evident that the discharge parameter values namely TSS, TDS, BOD and COD are exceeding limits.**

VI. OBSERVATION FROM ANALYSIS RESULTS

The concentration of TSS,TDS and COD for exceed the permissible/design value while the value of BOD exceeds marginally.

The SS Concentration is 1398 mg/l versus < 300 mg/l, similarly TDS 14030 mg/l, BOD 497 mg/l and COD 1492 mg/l versus TDS 3000 mg/l, BOD < 400 mg/l, COD < 1000 mg/l respectively.

The Monthly Average incoming flow is 85 MLD.

A careful look at the performance of Primary treatment units indicate average SS removed efficiency of 50- 60 % . Even with this efficiency, the outlet SS concentration reaching the SBR units is very high due to SS carry over from SBC-1 and SBC-2.

The MLVSS to MLSS ratio is observed to remain between 50 to 60 % indicating high concentration of inorganic solids.

The ability of the MLSS is poor , which seems to be due to high TDS (10,000 mg/l – 13,000 mg/l)which does not permit satisfactory settlement.

The chlorine contact tank provides a contact time of 2 minutes only which is not adequate.

VII. REQUIRED UPGRADATION OF CETP

(a) **Reduction in SS Level**:

- SS load is much higher than the design parameter which is resulting in poor efficiency of the gravity settling in SBC in primary treatment section of the plant.
- The higher inorganic SS Load from primary treatment section of the plant is carried into the biological treatment section of the plant which is affecting MLVSS/MLSS ratio and thus resulting into poor efficiency of the bio reactor.
- The SS load after primary treatment section of the plant must be < 100 mg/l which is at present in range of 300-600 mg/l.
- It is concluded that the first priority for improvement in plant performance is to bring down SS Load after primary treatment to < 100 mg/l.
- In order to achieve additional facility for removal of SS in primary treatment section and optimize dosing of chemical is required.

Treatability study for controlling of SS load at inlet of Bio-Reactor

PARAMETER	SS LEVEL AFTER PRIMARY TREATMENT SETTLING, mg/l	CORRESPONDING COD LEVEL AFTER PRIMARY TREATMENT SETTLING, mg/l
Present plant condition	300-600	850-1000
Extended Settling at Lab w/o chemical treatment (Supernatant)	150-250	750-900
Extended settling at Lab with treatment with lime + FS+ PE.	70-80	650-850

(b) **Reduction of Refractory COD**:

- Inlet COD level of the waste water is higher than the design value. Higher COD value may be due to presence of higher SS Load in the effluent or may be due to presence of refractory COD in effluent.
- The higher ratio of COD/BOD than the design parameter also shows presence of refractory COD in the waste water which cannot be reduced in conventional biological treatment.
- For reduction of refractory COD chemical enhanced tertiary treatment such as chlorination and ozonization /H2O2 treatment is used.
- Treatability study on effect of chlorination on present final discharge waste water was conducted and results of same is tabulated:

DOSING CHEMICAL: Sod. Hypo Solution, 5 % Concentration.		
Dosing concentration as Cl, ppm	Initial COD, mg/l	COD after treatment, mg/l
10	327	294
20	327	268
30	327	265

- Results shows that with chlorination treatment, COD Reduction of 5% to 15% is achieved in treated waste water. Initial treatability shows positive indication of using chlorine as oxidation agent for the reduction of refractory COD

VII. CONCLUSIONS

It is thus concluded from the study that the first priority for the improvement in plant performance is to bring down SS load after primary treatment to < 100 mg/l. In order to

achieve this additional facility for removal of SS in primary treatment section and optimized dosing of chemical is required. Thus by adding an extended settling with pH correction system will help reduce the SS load at outlet of primary treatment stage and which ultimately also reduces COD load.

Further COD load can be reduced by provision of chlorination chamber which showed reduction in COD upto 5% - 15% at final outlet.

VIII. REFERENCES

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