

PERFORMANCE EVALUATION OF 200MGD SEWAGE TREATMENT PLANT (STP) AT HAIDERPUR, DELHI

Mr. Bhuma Prakash¹, Mr. Rahul Bansal², Mr. Vaibhav Kamboj³,
 Mr. Kushal Sharma⁴, Mr. Shivam Aggarwal⁵
^{1,2,3,5} Student, ⁴ Guide
 Civil Engineering Department, M.V.S.I.T, Sonipat

ABSTRACT: *The present study has been undertaken to evaluate the performance of 200MGD sewage treatment plant located at HAIDERPUR, DELHI. Optimizing water treatment plant operation is a concept should be applied to all plants because some operational improvements can always be made. Optimization at a water treatment plant can be considered achieved when certain goals are being met to attain the most efficient use of the water treatment plant facilities. The most important goals are to reduce the water wastes, manage the energy consumption. The project deals with the design of the Sewage Treatment plant and its major components such as Screening chamber, Grit chamber, Skimming tank, Sedimentation tank, etc. The conclusions of these evaluations may determine required recommendations and focus on modification requirements for the STP and will also determine whether the effluent discharged into the water body are under limits given by MPCB. The conclusions drawn from this study will outline the need for continuous monitoring and performance analysis by removal efficiencies of each and every unit of STP. Administrative capability and adequacy of maintenance systems were evaluated using questionnaires and by conducting staff interviews.*

Keywords: - domestic waste water, efficiency, evaluation, performance, dilution, activated sludge.

I. INTRODUCTION

Sewage contains various types of impurities and disease bacteria. This sewage is disposed of by dilution or on land after its collection and conveyance. If the sewage is directly disposed of, it will be acted upon the natural forces, which will convert it into harmful substances. The natural forces of purification cannot purify any amount of sewage within specified time. If the quantity of sewage is more, then receiving water will become polluted or the land will become sewage sick. Sewage treatment is the process of removing contaminants from municipal wastewater, containing mainly household sewage plus some industrial wastewater. Physical, chemical, and biological processes are used in sewage treatment plant.

Treatment Of Sewage : The treatment of sewage consists of many complex functions. The degree of treatment depends upon the characteristics of the raw inlet sewage as well as the required effluent characteristics Treatment processes are often classified as

- i) Preliminary treatment
- ii) Primary treatment
- iii) Secondary treatment

iv) Tertiary treatment

II. PRELIMINARY TREATMENT

Preliminary treatment consists solely in separating the floating materials like tree branches, papers, pieces of rags, wood etc. and heavy settleable inorganic solids. It helps in removal of oils and greases and reduces the BOD by 15% to 30%. The processes under this are Screening: to remove floating papers, rags, clothes Grit chamber: to remove grit and sand Skimming tank: to remove oils and greases

PRIMARY TREATMENT:

Primary treatment consists in removing large suspended organic solids. It is usually accomplished by sedimentation in settling basins. The liquid effluent from the primary treatment often contains a large amount of suspended organic material and has a high BOD (about 60% of original)

SECONDARY TREATMENT

Here the effluent from primary treatment is treated through biological decomposition of organic matter carried out either aerobic or anaerobic conditions.

TERTIARY TREATMENT

The purpose of tertiary treatment is to provide a final treatment stage to raise the effluent quality before it is discharged to the receiving environment (sea, river, lake, ground, etc). More than one tertiary treatment process may be used at any treatment plant. Disinfection is practiced, it is always the final process. It is also known as "effluent polishing"

Salient Details Of Haiderpur water treatment plant :

Feed Channel from WJC	Length: 100ft Width: 12ft-6inch Height: 7ft
Population served	18 lacs approx. Pitampura, Shalimar Bagh, Saraswati Vihar, Paschim Vihar, North-West Delhi
Raw Water Pump House	
Silt-chamber	145ft x 20ft
Sump	152ft x 20ft
Pump house with ANNEXE	80 x 16
Raw Water Pump	10 Nos.
Capacity	110 kw 22MGD each
Raw Water Main	4 Nos. --- 1100 mm dia

	Length- 100ft
Pre treatment	
Main inlet Sump	16ft x 16ft
Flash mixer	8ft x 8ft
Detention Period	30 sec
Clariflocculators	8 Nos.
Capacity	12.5 MGD
Size	160ft dia SWD 12ft-6inch 66ft inner dia SWD 17ft-7inch
Detention Period	Flocculating Chamber – 20min Clarifier – 2.5 hrs
Surface Loading	750 gallons/sqft/day
CHEMICAL HOUSE	
Area	500sqft
Maxium alum dose	60 ppm
Capacity of each tank	(11 ft x 11ft x 6ft) 4hrs. @ 5% solution
12 Nos. tanks	4500 gallons
Alum Godown	600 MT each
Filtration Plant	
Filter House	2 Nos.(348 x 100 ft)
Number of Filters	25 x 2(26 x 35 ft each)
Capacity of Filters	2 MGD each
Rate of Back Washing	10 gal/sqft/min
Rate of Air Sourcing	2cft/min
Working Area of Each Filter	836sqft
Rate of Filtration	100 gal/sqft/hour
Blower in Each Plant	3 Nos.(840cft/min)
Back Washing Pumps	4 Nos.(2800 gal/min)
Filter Sand Media	
Fine Sand	1/32 to 1/16 inch = 24 inch
Coarse Sand	1/16 to 1/8 inch = 6 inch
Gravel	1/8 to 1/4 inch = 4 inch
Gravel	1/4 to 1/2 inch = 2 inch
Fine Gravel	1/2 to 1 inch = 2 inch
Coarse Gravel	1 to 2 inch = 2 inch

coordination of TATA in future if required.

III. CONCLUSION

Due to industrialisation and rapid population growth water contamination and demand have increased, hence it is essential to provide water treatment plant.

Bases on the laboratory analysis and the operating data of sewage treatment plant, it is concluded that:

1. Average BOD at inlet is 134.63 mg/l with maximum of 151 mg/l and minimum of 113 mg/l respectively. After the advanced treatment, average BOD at outlet was observed to be 5.36 mg/l. Maximum BOD at effluent is 7 mg/l. Effluent BOD is within standard limits of discharging in the creek.
2. The overall BOD removal efficiency is 96 %.
3. The concentration of total suspended solids at inlet was observed to be 135.64 mg/l with the removal efficiency of 92.74% of which about 18.67 % of suspended solids were removed in degritor (primary treatment) itself.
4. The overall total suspended solids removal efficiency is 92.74 %.
5. The removal efficiencies of total nitrogen and phosphates were 75.67 % and 71.79 % respectively.
6. Screening unit : As per the CPHEEO manual , the head loss at screen should be 5 cm, but here it was observed as 25 cm, which is due to the clogging of organic/suspended matter/floating matter carried with the sewage. Screens need to be cleaned regularly with proper schedule.

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Comparison between IS : 3307-1986 and expected effluent's characteristics :

S.No	Characteristics	Tolerance limit as per IS : 3307-1986	Raw sewage	Effluent from the plant
1	pH	5.5-9.0	6.5	5.5-9.0
2	BOD	100mg/l	300mg/l	≤20mg/l
3	Suspended solids	200mg/l	600mg/l	≤30mg/l
4	Oil & grease	10mg/l	50mg/l	≤5mg/l
5	Chlorides	600mg/l	800mg/l	≤400mg/l
6	Sulphates	1000mg/l	1500mg/l	≤250mg/l

FUTURE PLAN OF STP:

During visiting on the plant and meeting with Satish Gupta (currently chief engineer of Plant), we come to know that future plan is for establishing tertiary treatment units with