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COMPARATIVE ANALYSIS OF EFFLUENT FROM VARIOUS STP's WITH CPCB STANDARD IN GREATERNOIDA REGION

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ABSTRACT--*Sewage treatment plays a vital role before disposing of the wastewater directly into a river or land. Therefore, proper sewage treatment should be given to wastewater or sewage. The need to perform this study is to examine whether the effluent from the sewage treatment plant complies with the general standard of the central Pollution control board. In this study samples are collected from the vent of the conduct stand and analyses the devastate of water superiority parameter. The conclusions draw from this study will determine the sewage discharge is under the acceptable limit followed by cpcb.*

Keywords-- *water, sewage, affluent, Treatment*

I. INTRODUCTION

1.1 General

Waste water is the water that has been affected by anthropogenic activities. Wastewater is the water is the used water of household, manufacturing, profit-making or farming actions, plane overflow water and any sewer inflow. so wastewater is a result of household, engineering, profit-making or farming actions. The distinctiveness of waste water varies depending on the resource.

Sewage management is a method to remove contaminants from municipal sewage water. The term sewage treatment plant is now a day's often replaced with the word waste water treatment plant or wastewater management station. Physical, chemical and biological methods used to eliminate contaminants and create processed waste water (or processed effluent) that is protected adequate for discharge into the atmosphere.

Treatment - methods generally adopted by- STP

Manure prior to being liable stream the degree of treatment has been given depends on the source of disposal. Conservative wastewater management consists of unique processes and operations to eradicate solid items, macrobiotic material generally explain special rising action level are beginning, derived and tertiary and superior wastewater management. In few countries disinfections to remove pathogens from time to time follow the preceding action stride.

Preliminary Treatments:

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This procedure simply consists of viewing for removing suspended supplies such as papers, rags, cloths, tree branches, etc. grit chamber or debris tanks for remove stones

Primary Treatment

occasionally, the beginning, as well as main treatements are classified together under primary treatment. This process consists of removing large suspended bio products and has a high BOD.

Secondary Treatment

This process involve an extra handling of the effluents from main sedimentation tanks. This is usually consummate during the natural decay of natural material, that will be taken out one by aerobic or aerobic conditions. These organic bacteria shall be go moldy the fine organic matter to produce clearer effluent. The handling reactors, where the natural substance is shattered and steady by bacteria known as anaerobic biological units and many consists of anaerobic lagoons, septic tanks, Imhoff tank, etc.

The final Treatment

The process is also known as tertiary treatment and it consists of remove the unrefined

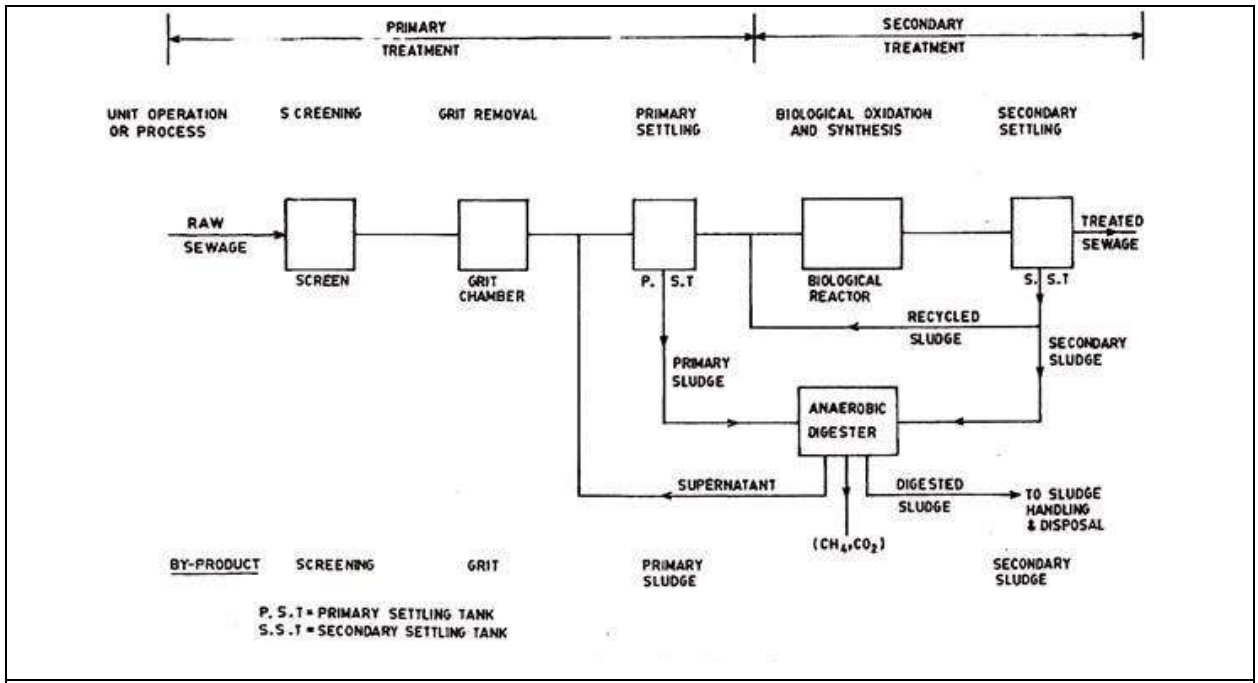

Figure 1: General flow diagram of the sewage treatment plant

1.2 Sewage Treatment Plants in Greater Noida

137 MLD Sewage Treatment Plants based on SBR Technology

This sewage treatment plant is located at Kasna, Greaternoida, UttarPradesh. The present capacity of the sewage treatment plant about 137 MLD. This sewage treatment plant operates under HNB Engineering PVT.LTD.The sewage treatment plant at kasna consists of 6 sequencing batch reactor (SBR). The wastewater come through the inlet pipe after passes through fine screens bars it passes through the various treatment process

it enter into sbr tank. After this waste warte is driven for chlirnation at the end of the process. This treated water is used for different purpose and the remaining rest of water is drain into near nalla. The inorganic waste removed from grit chamber is used for fertilizer.

II. Specification of plant:-

- **Screens:** it consists 4 fine screen in which three works automatically and one is operated mechanically. The size of mechanically screen is 8mX1.6mX1.5m and it inclined 60° to horizontal with 20mm spacing between bars.
- **Reactor:** it consists 6 reactors and size of reactor is 70mX34mX5.2m+0.5FB
- BOD considered at inlet: 85 Mg/l
- Total time required to complete of one cycle is 4 hrs.
- The 137 MLD treatment plant that discharge an effulient with follow parameters:
- BOD: ≤10 mgl
- COD: ≤ 50 mg/L
- PH : 6.5 – 9 mg/L
- Tss: ≤10 MG/L

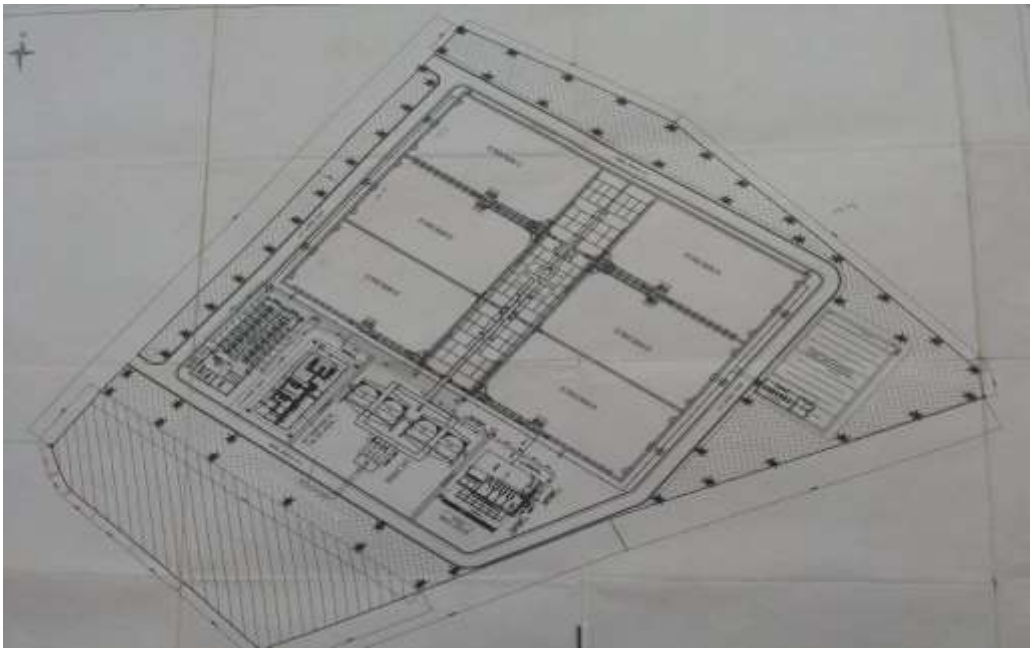

Figure 2: The layout of the sewage treatment plant at kasana

15 MLD Sewage Treatment plant based on SBR Technology

This treatment plant is located at Ecotech II, Greater Noida, U.P. The present capacity of sewage treatment plant is 15 MLD and it operated under HNB Engineering Pvt. Ltd. This treatment plant also based on Sequential Batch Reactor (SBR).

Figure 3: 15 MLD sewage treatment plant at Ecotech II, Greaternoida

III. METHODOLOGY

The methodology adopted for present study includes the following

3.1 Site selection and point of sampling.

Samples for their examine were collected from the two STP's that are mentioned below

1. 137 MLD STP in kasna, greaternoida
2. 15 MLD STP in Ecotech II greaternoida

The major area from where the sample collected:

1. FinalOutlet of kasna STP
2. Final Outlet of Ecotech II STP

3.2 Collection of Samples

The samples are taken in the month of February, March to examine their physical and chemical parameters.

3.3 Parameter Analyses

3.4 Method for parameter analyses

pH

Method: electrometric method of pH determination.

Temperature

Method: *Digital* thermometer *is used for analyses of temperature*

Procedure

- Take 100ml of sample in a conical flask.
- Put the digital thermometer into the beaker that contains the sample.
- The instrument shows the reading in Celsius (◦c).

Total suspended solids (TSS)

Method: Membrane filtration method

Procedure

- Take 50ml of sample in gooch crucible.
- Place the gooch crucible on the glass fiber apparatus.
- Switch on the electrical supply.
- Liquid passes in the glass fiber.
- Solids remains on the asbestos layer.
- Weigh the empty gooch crucible before experiment and after drying the crucible at about 103°C in an oven to 15 min.

Calculation

Total suspended solids

$$=\frac{(weight\ of\ gooch\ crucible+residue)-(weight\ of\ empty\ gooch\ crucible}{volume\ of\ sample\ taken}X1000$$

Biochemical Oxygen Demand (BOD)

Method: Winkler titration

$$BOD_5 =\frac{(D_1-D_2)-(B_1-B_2)f}{p}$$

$$f = \frac{volume\ of\ dilution\ water\ in\ sample}{volume\ of\ BOD\ bottle}$$

Chemical Oxygen Demand:

Method: *Closed Reflux Titrimetry*

Procedure

- Take 50 ml of sample or smaller amount dilute 50 ml in a refluxing flask
- Add 1g of $HgSO_4$ and 5ml of H_2SO_4(in which 1gm of silver sulphate is present in every 75ml acid).
- Add slowly to dissolve $HgSO_4$. Cool the mixture. Add 25ml of 0.25N $K_2Cr_2O_7$ solution and again mix. Attach the condenser and start the cooling of water.
- Add the remaining acid agent 70 mL through the open end of the condenser, mix the refluxing mixture. Apply the heat and reflux the mixture for 2hr and cool.
- Dilute the mixture to about 300 ml and tirate the excess of the dichromate with the standard

- The colour changes from yellow to green blue and finally red. Record the ml of titrant used.
- Reflux in the same manner a blank consisting of distilled water equal to the volume of the sample and the reagents. Titrate as for sample. Record the ml of titrant used.

Calculation

$$COD=\frac{((A-B)C \text{ X } 8 \text{ X} 1000)}{\text{ML sample}}$$

Where: A = Ml of ferrous ammonium sulphate used for blank.

B = Ml of ferrous ammonium sulphate used for the sample.

Table 3.1: Central pollution control board (CPCB) general standards for the discharge of environmental pollution according to the environment (protection) rule,1986 schedule –VI part A: Effluents

Perameter	**Inland of surface water**	**public sewer**	**Land for irrigation**	**Marine costal area**
Colour and odour	-	-	-	-
Suspended solids	100Mg/l	600Mg/l	200Mg/l	a. for process of wastage water b. for cooling water effluent 10 percent
Particle size of suspended solids	Shall pass 850 micron IS Sieve	-	-	a. Floatable solids, max. 3 mm. (b) settleable solids, max 856 microns
pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
Temperature	Shall not exceed 5°C above the receiving water temperature	-	-	Shall not exceed 5°C above the receiving water temperature
Oil and grease	10 Mg/l	20Mg/l	10Mg/l	20Mg/l
Total residual chlorine	1.0Mg/l	-	-	1.0Mg/1
Ammonical nitrazon as N	50Mg/l	50 mg/l	-	50Mg/l
Total kzeldhal nitrozen	100Mg/l	-	-	100Mg/l
Free ammonia as NH3	5.0Mg/l	-	-	5.0Mg/l

Biochemical oxygen demand (3 days at 27°C)	30Mg/l	350Mg/l	100Mg/l	100Mg/l
Chemical oxygen demand	250Mg/l	-	-	250Mg/l
Arsenic as AS	0.2	0.2	0.2	0.2
Mercury as hg	0.01 Mg/l	0.01Mg/l	-	0.01mg/1
Lead (as Pb)	0.1 mgl	1.0Mg/l	-	2.0 mgl
Cadmium (as Cd)	2.0 mgl	1.0mgl	-	2.0Mg/l
Hexavalent chromium (as Cr+6)	0.1 mgl	2.0 mgl	-	0.1 mgl
Total chromium (as Cr)	2.0mgl	2.0Mg/l	-	2.0Mg/l
Copper (as Cu)	3.0Mg/l	3.0Mg/l	-	3.0Mg/l
Zinc (as Zn)	5.0mgl	15Mg/l	-	15Mg/l
Cyanide (as CN)	0.2mgl	2.0Mg/l	0.2Mg/l	0.2Mg/l
Selenium as SE	0.05	0.05	-	0.05
Fluoride (as F)	2.0Mg/l	15Mg/l	-	15Mg/l
Nickel (as Ni)	3.0Mg/l	3.0Mg/l		5.0mgl
Dissolved phosphate (as P)	5.0mgl	-	-	-
Sulphide (as S)	2.0 mgl	-	-	5.0mgl
phenolic compound as C_6H_50H	1.0mgl	5.0mgl	-	5.0mgl
Bio assay test	90 percent of fish after 96 hr in 100 percent affluent	90 percent of fish after 96 hr in 100 percent affluent	90 percent of fish after 96 hr in 100 percent affluent	90 percent of fish after 96 hr in 100 percent affluent
Manganese	2Mg/l	2Mg/l	-	2Mg/l
Iron (as Fe)	3Mg/l	3Mg/l	-	3Mg/l
Vanadium (as V)	0.2Mg/l	0.2Mg/l	-	0.2Mg/l
Nitrate nitrogen	10Mg/l	-	-	20Mg/l

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Radioactive materials: a) Alfa emiters micro curieMg/l	10^{-7}	10^{-7}	10^{-8}	10^{-7}
b) Beeta Mg/l	10^{-6}	10^{-6}	10^{-7}	10^{-6}

IV. RESULT AND CONCLUSION

4.1 Results

Table 4.1: February

Parameters	**Kasna STP**	**Ecotech II STP**
pH	7.52	7.86
TSS	8Mg/l	7Mg/l
BOD	7.82Mg/l	8.3Mg/l
COD	36Mg/l	37Mg/l
Temperature	18.7°C	19.4°C

Table 4.2: characteristics of effluent of two STP's in the month of March

Parameter	**Kasna STP**	**Ecotech II STP**
pH	8.24	8.67
TSS	7Mg/l	6Mg/l
BOD	8.1Mg/l	8.5Mg/l
COD	32Mg/l	36Mg/l
Temperature	24.7°C	25.2°C

Table 4.3: of the comparison of 2 STP environment pollution.

Parameter	**Kasna STP**	**Ecotech II STP**	**Comparison of results with CPCB standards of effluent discharge into water**
pH	7.75	8.27	Lowerthan permisable limit
TSS	7.5Mg/l	6.5Mg/l	Lowerthan permisable limit
BOD	7.96Mg/l	8.4Mg/l	Lowerthan permisable limit
COD	34Mg/l	36.5Mg/l	Lowerthan permisable limit
Temperature	21.7°C	22.3°C	Lowerthan permisable limit

4.2 CONCLUSIONS

The study conducted for the comparison of two sewage treatment plant parameter with Central Pollution Control Board effluent standard the following conclusion are

- Physical and chemical parameter estimated for Kasna and Ecotech II STP was lower than the permissible limit. These limits successively follow the CPCB standard of effluent discharge.
- The average BOD effluent from kasna plant was 7.96Mg/l and from Ecotech II was 8.4Mg/l whichis acceptable and under the plant limit.
- The average COD effluent from Kasna plant was 34Mg/l and from Ecotech II was 36.5Mg/l which is also acceptable.
- The average TSS effluent from Kasna plant was 7.5Mg/l and from Ecotech II was 6.5Mg/l which is acceptable.
- The average pH at outlet was 7.75 while Ecotech II was 8.27.

REFERENCES

1. Swati Agnihotri, SurendraSuthar, and Abid Ali Khan. Performance evaluation of sewage treatment plants based on SBR and MBBR technology.International Journal of Technical Innovation in Modern Engineering & Science (IJTIMES) Impact Factor: 5.22 (SJIF-2017), e-ISSN: 2455-2585 Volume 5, Issue 03, March-2019.
2. Faheem khan, Nitin sharma, AvneetKr.Singh, Shobha Ram. Performance evaluation of 137 MLD sewage treatment plant at Kasna- U.P, India.international Journal of Engineering and Innovation Technology (IJEIT) Volume 5, Issue 7, January 2016.
3. Prerna Sharma, Dr. R.K Khitoliya and Dr. S.Kumar.2.3 A comparative study of sewerage treatment plants with different Technologies in the vicinity of Chandigarh city.IOSR Journal Of Environmental Science, Toxicology And Food Technology (IOSR-JESTFT) e-ISSN: 2319-2402,p- ISSN: 2319-2399. Volume 4, Issue 5 (May. - Jun. 2013), PP 113-121.
4. S. S. Turkar, D. B. Bharti and G. S. Gaikwad.Various methods involved in wastewater treatment to control water pollution.J. Chem. Pharm. Res., 2011, 3(2):58-65.
5. Priyanka Jamwal, Atul K. Mittal and Jean-Marie Mouchel.Efficiency evaluation of sewage treatment plants with different technologies in Delhi (India). Received: 11 November 2007 / Accepted: 14 April 2008.
6. AshutoshPipraiya.Performance Evaluation of Wastewater Treatment Plant Based on MBBR Technology-A Case Study of Kaithal Town, Haryana (India). International Journal of Advanced Engineering and Research Development Volume 4, Issue 6, June -2017.
7. S.K. Garg. Sewage disposal and air pollution engineering.Envirnomental Engineering (Vol. II).
8. Nadeem A Khan.Review on SBR (Sequencing Batch Reactor) Treatments Technology of Industrial Wastewater.
9. Ravichandran.M and Joshua Amarnath.D. Performance Evaluation of Moving Bed Bio-Film Reactor Technology for Treatment of Domestic Waste Water in Industrial Area at MEPZ (Madras Exports Processing Zone), Tambaram, Chennai, India, Elixir Pollution 53 (2012) 11741-11744.