Activated Sludge Process With Diffused Aeration Technology.

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Of the many processes available for Biological Waste Treatment, the Activated Sludge Process has been by far the most popular. The West Coast Paper Mills Limited, Dandeli took up E.T.P. upgradation / modernisation in the year 2002.2003 along with up gradation of Pulp Mill, Paper Machines, Chemical Recovery Plant and Power House. During the modernisation period the utmost importance was given to reduce the pollution at source in various sections of the mills by introducing environment friendly technologies in addition, to introduce new technology for effluent treatment. This paper deals with description of Diffused Aeration technology installed for Pulp Mill effluent stream after primary clarification and our experiences in setting up new effluent treatment plant as a case study.

INTRODUCTION

The main feature of the upgraded E.T.P. is Diffused Aeration System, first of its kind in integrated Pulp and paper Industries in India. The designing of E.T.P. is based on the COD loading and not on the BOD loading. This has been taken in to the consideration looking to BOD and COD ratio of raw effluent. The oxygenation capacity is based on COD loading. Once in treatment sequence if the COD reduction is well controlled, the BOD is automatically controlled.

Another important feature of treatment process is third stage treatment of treated trade effluent is polishing pond with aeration facilities to boost up DO level in the range of 3.0 to 4.0 ppm in the treated effluent which is being discharged to down stream of Kali.

Surface aeration system has limitations with regard to complete mixing of air with effluent. The Diffused Aeration System has advantages with respect to uniform mixing of the air with the effluent in maintaining the DO profile of the aeration basin, which provides the extra cushion to encounter shock load and help in maintaining consistent effluent characteristics of treated effluent.

Effluent Treatment Process

The main treatment process consists, of the following steps.

Pre Treatment Stage

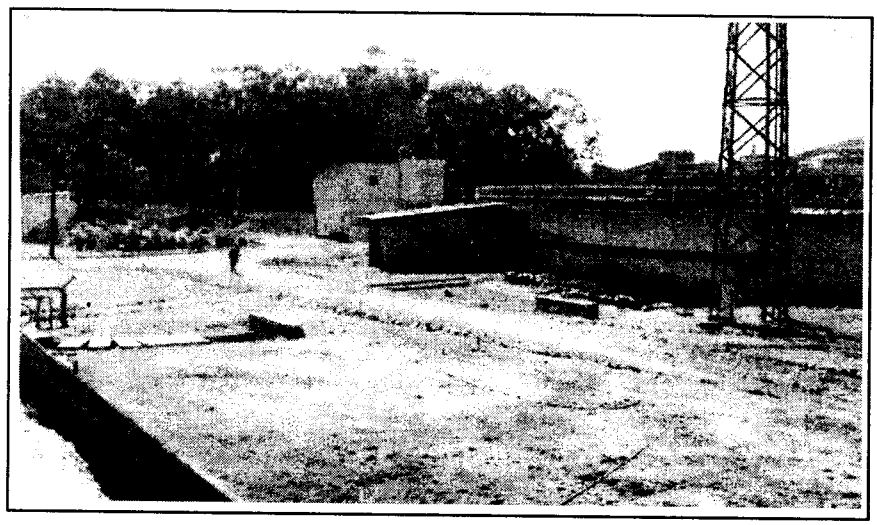
In the stage of treatment, the combined raw effluent of Pulp Mill, Power House, Chemical Recovery Plant and Bleach Liquor slurry, first subjected to stationary bar screens in the grit chamber. Here, provisions are made for chemical dozing to adjust the pH and excess chlorine of incoming row effluent as and when required before primary clarification stage.

Primary Clarification Stage

The screened raw effluent is pumped to primary clarifier for gravity settling of the settleable material. Here effluent is subjected to 2 to 2½ hrs retention period.

Secondary Biological Treatment

The clarified effluent is given secondary biological treatment in two numbers of Aeration tanks, which are kept in parallel, equipped with diffusers



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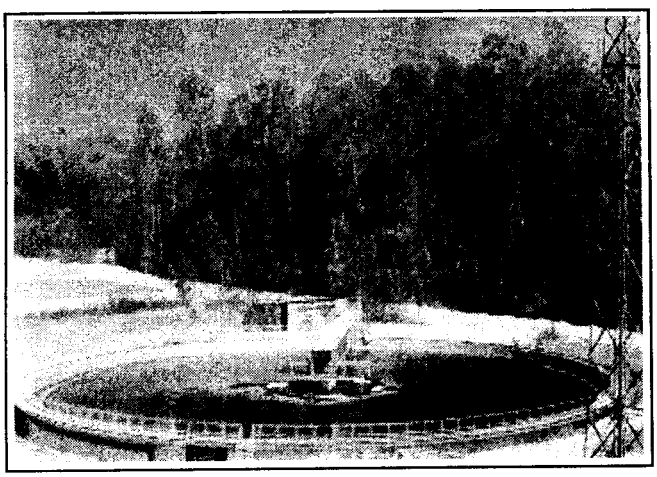
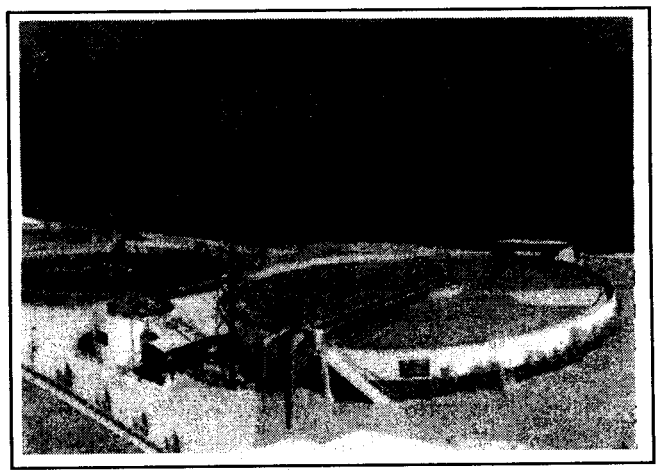
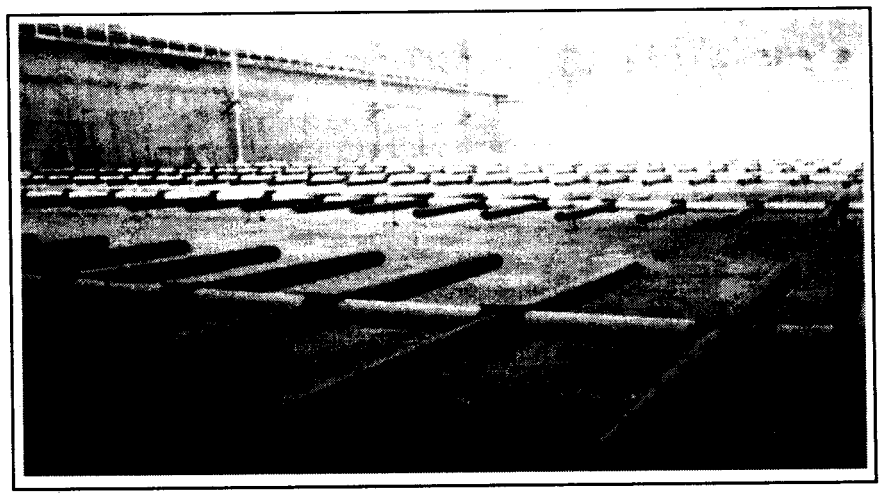




for Biological degradation of the waste, The clarified effluent before entering the aeration basin in mixed with domestic sewage to treat it with Activated Sludge Process.

Prior to aeration basin, the provisions have been made for flow measurement. pH adjustment and nutrient dozing in order to ensure that the incoming effluent is completely suitable for biological treatment. The content of aeration tank after minimum retention of 12 hrs are transferred to secondary clarifier for the floc separation. The overflow of the secondary clarifier is finally treated effluent, which is taken to polishing pond along with treated Paper machine combined effluent. In the polishing pond the treated effluent gets retention of 1½ days, which helps in bring down further S.S. value of treated effluent.



The overflow of the Polishing pond leads to flow monitoring station via open channel where the arrangements

Stream No 1 (Pulp Mill, CRP, Power House combined effluent) - Activated Sludge Process.

Parameter	Raw effluent	After Primary Clarification	After Secondary Clarification	Finally Treated Effluent after 3rd Stage (combined Stream 1 & 2)	K.S.P.C.B. stipulated std
S.S. ppm	150 - 175	30 - 40	20 - 30	30 - 35	50 (max)
C.O.D. pmm	700 - 800	600 - 700	180 - 220	140 - 180	250 (max)
B.O.D. ppm	180 - 220	140 - 180	20 - 22	15 - 20	30 (max)

Stream No 2 (Paper Machine combined effluent - 1 + 2 + 3 + Duplex (4 + 5)

S.S. ppm	700 - 800	15 - 25	-	-	-
C.O.D. ppm	150 - 200	80 - 100	-	-	-
B.O.D. ppm	50 - 60	15 - 20	-	-	-

have been made to continuously monitor the flow of the treated effluent, pH, DO and Temperature of the out going effluent along with online bio-monitoring facility.

Diffused Aeration System

The whole technology of the Diffused Aeration System has been provided by Environmental Dynamics Inc. Colombia. The two aeration tanks work in parallel and each tank is equipped with 600 numbers of diffusers of 4 ft long and 4 inch in dia has a capacity of 12- scfm-air discharge. To supply air, 3 numbers of twin lobe compressors are fixed, with 425 HP motor each. The capacity of air discharge is 12,500-m^3/ hr. The system employs a main header and valved lateral piping system to distribute air through out the aeration tank. The air laterals, supply air to diffusers. It is a complete mixed process, where the contents are uniformly mixed and aerated to maintain constant concentration. The completely mixed system rapidly distributes the influent flow and returned sludge to through out the aeration zone. In this process, the air is pumped into the diffusers fixed to the bottom of the tank, where it emerges as fine bubbles allowing the oxygen to dissolve as they arise.

Operating results, with installation of above plant, we are able to achieve the norms for the treated effluent very comfortably.

The plant is also able to take care of shocks coming from the process plant.

Given in table on page No. 118 are the typical test results

we are able to achieve from this plant.

CONCLUSION

The Diffused Aeration System has definite edge over the surface aeration system. The surface aerator act like a half submerged mixers, rotating on the surface of the tank for mixing and entraining air in to the aeration tank, whereas diffused aeration system provides complete mixing of air with effluent.

REFERENCES

1. EDI Aeration / Mixing mini panel installation Operation and Maintenance Manual.
2. Process Commissioning Manual-Amazon Envirotech Pvt. Ltd.