Upgradation of Effluent Treatment Plant of Mysore Paper Mills Limited, Bhadravati

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EXISTING FAILICITIES

MPM established the existing effluent treatment plant based on activated sludge process in 1981 along with its 75,000 TPA newsprint project. The mixed effluent from the pulp, paper and sugar mills after primary clarification, were subjected to conventional activated sludge treatment and some details of this system are:

The combined effluent from pulp and paper mills reach ETP in two parallel streams. This effluent after coarse screening is subjected to primary clarification in two clarifiers of 46.7 metre and 36.6 metre diameter respectively. The primary under flow and the excess secondary sludge is thickened in a 19.8 metre diameter thickener and filtered on a rotary vacuum drum filter. The sludge obtained with 15-18% solids is disposed off as solid waste and is mainly used as fuel after sun drying. A portion of it is used for board manufacturing by nearby board mills.

The primary under flow is mixed with colony sewage, nutrients like DAP and Urea and the return sludge from secondary clarifiers is led into the parallel aeration basins of 13.5m x 18m x 4m LD. 14 fixed surface aerators of 50 HP each aerate the effluent, before it is taken to two secondary clarifiers of 52.6m diameter. The clear over flow from the secondary clarifier is discharged into river Bhadra.

At the time of installation of Effluent Treatment Plant, and in the initial years, the load to Effluent Treatment Plant was less as neither the Cultural Paper Mill nor newsprint mill was running to full capacity and a substantial amount of purchased fibre was being used.

Later in 1985 a Sugar mill with 2500 tcd was added and in 1988 a bagasse pulping plant of 60 tpd was added.

The pollutant load on the plant started increasing in recent years as the capacity utilisation of the in house pulp mills had increased, due to improved raw material availability from the capative plantations and booming paper market and record production was achieved in the year 1995-96. With Pollution Control laws being more stringent and the implementation also becoming strict and this called for the upgradation of ETP. At that time, Indo-Dutch Project on Cleaner Production Technologies was also in the process of getting finalised. As it was almost certain this project will be finally through, MPM went ahead with the upgradation of Effluent Treatment Plant so that the parameters prescribed by the Pollution Control Board will be met and also to take care of the proposed expansion of sugar mill from 2500 tcd to 5000 tcd crushing capacity.

Further, the following factors were also considered to bring in compliance with Pollution Control Board requirements.

- The failure of water recycling system of the wet bagasse storage yard, leading to drastic increase in the hydraulic and suspended solids load on the plant.
- The presence of bagasse pith in effluent also affecting the settling of sludge in primary clarifiers and thickeners.
- A considerable stretch of the Bhadra river reaches anoxic condition after the discharge of MPM effluent in summer due to the very low fair weather dilution available in the

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river. In view of this, KSPCB had also specified that a minimum of 4 mg/l of dissolved oxygen in the effluent at the discharge point into the river.

- As the plant was operating at critical load and was extremely sensitive to any sudden shock loads, the discharge parameters were exceeding the statutory norms frequently.
- The thickened sludge has to be led to dry bed in case of filter failures as there is only one filter.
- The KSPCB was also insisting to minimise the colour of the treated effluent as far as practicable even though they had not prescribed any standard for the colour.
- The raw sewage from the colony on the way to Effluent Treatment Plant of the Paper Mill through open lands was pilfered by the local farmers and the surplus raw sewage was reaching the river upstream of water intake points the mill and the town.

SEGREGATION OF EFFLUENTS

The effluents from various sections are segregated for selective treatment, into three streams, namely;

Table-1

Flow Distribution to Different Streams of Segregation of Effluents

STREAM -I	
Source	**Prodn. M^3/d**
Paper Machine 1, 2 and 3	9470
Bagasse yard	5725 (3825+1900)
Paper Machine - 4	18820
Sugar Mill	1150
Total	35165
STREAM-II	
Chemi Mechanical pulping plant	6710
Bamboo/wood chemical pulp mill	14620
Evaporators	1730
SR Boiler	625
Canteen	100
DM Plant	755
CPM-1	7725
	32265
STREAM-III	
TG Cooling Tower	2065
Fire Fighting tank	300
Process condensate for sugar mill	665
Sugar mill Cooling water	1185
Coal yard	400
CF Boilers	105
Hypo Plant	20
Causticizer	960
	5700

Stream-1: Non coloured effluents with mainly suspended organics.

Stream-II: Coloured effluents with mainly dissolved organics.

Stream-III: Non - coloured effluents with mainly suspended and dissolved in organics.

The flow into the above streams from various sections are given in Table-1.

The stream I & II are expected to have a suspended solid content of 570 mg/l and 460 mg/l respectively, before primary clarification. After clarification and colour removal, these are mixed together and subjected to aeration. The expected BOD in the influent to the aeration is about 335 mg/l. The effluent after secondary treatment would meet the limits laid down by the Pollution Control Board.

TREATMENT AFTER UPGRADATION

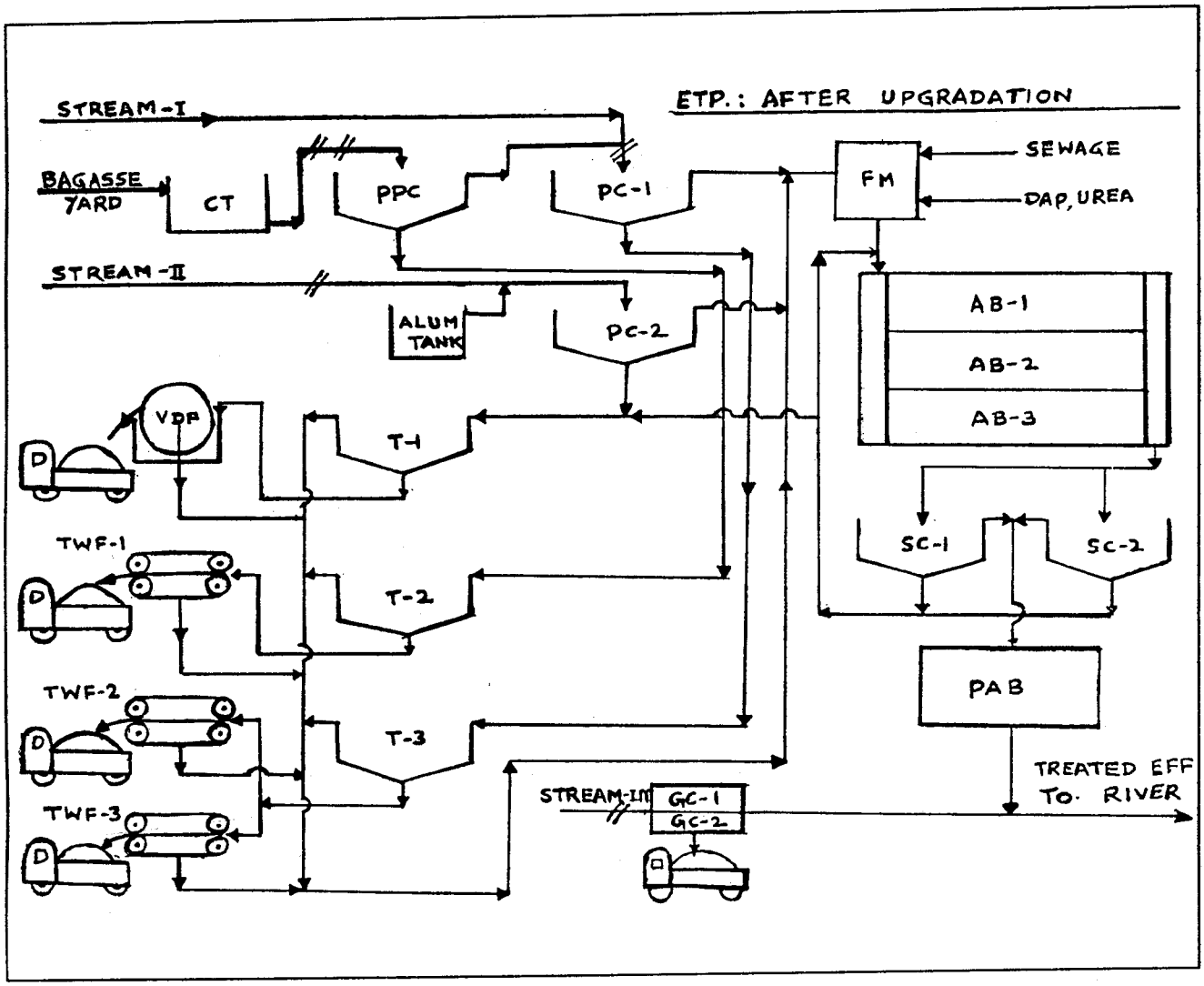
The basic flow diagram after upgradation is given in fig.-1.

The coloured effluents which are segregated into stream-II are treated with alum and flocculants to coagulate the colour in the primary treatment stage.

In the upgradation of the existing secondary treatment we have added another parallel aeration basin of 135m x 15m x 3m LD, with seven more aerators of 25 HP each.

After the primary and secondary treatment, effluent is taken for tertiary treatment where the D.O. is boosted to the level of 4 mg/l by surface aeration

FIG. - 1



and this is mixed with Stream - III.

Post aeration of effluents with 3 nos. of 7.5 HP aerators after secondary clarification to boost its dissolved oxygen content.

The solid handling system is improved by replacing the existing single vacuum drum filter with three members of twin wire belt filters with dedicated thickeners. This would provide more flexibility in handling the sludges from the various streams separately and would also increase the solid handling capacity.

SEWAGE TREATMENT PLANT

Separate treatment system for part of the sewage with UASB reactor followed by aeration and secondary clarification, to treat it to river discharge standards, and separate discharge stream of such treated sewage for irrigation.

EXPECTED BENEFITS OF UPGRADATION

- Rationalisation of the treatment system for better compliance with statutory norms including that of dissolved oxygen, by post aeration.
- Better BOD removal due to additional aeration capacity as well as the reduced hydraulic load on aeration system.
- Reduction in COD and BOD of effluents entering the aeration basin due to colour removal.
- Improved flexibility in the solid handling in thickeners and filters.
- Added flexibility in primary treatment, as Stream-1 thickener has been designed to serve as a clarifier in case of emergencies.
- Avoiding raw sewage from colony pollution the river water.
- Possibility of recycling primary clarified paper machine effluents for reuse in the process.
- Better usage of effluent sludge because of segregation and improved dewatering.