

Water Conservation Efforts by Seshasayee Paper and Boards Ltd. - An Experience

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ABSTRACT-- Paper Industry is one among the five traditionally strong industries which utilise agricultural and forest based raw materials and produce essentially consumer based products. The rapid growth of paper industry has a dual impact on the society. On one hand it contributes to improve literacy standards of the country while on the other, it affects the environment by deforestation, air and water pollution.

Most of the existing paper mills are going in for medium or large expansions to meet the future demand of paper in the country. Most of the expansion projects are based on the use of agricultural residues or waste paper as fibrous raw material thereby preventing deforestation to an extent. However, air and water pollution needs to be controlled as it is directly dependent on the increase in paper production. In this respect the paper industries have to adopt strict inplant control measures to reduce pollution at source and at the same time adopt cleaner production technologies.

Good in-house water management is needed to minimise the discharge of effluent. Such water management efforts will have to focus on reduction in fresh water consumption, recycling waste water and other measures which will eventually lead to a decrease in the quantum of effluent discharged.

This paper outlines the implementation of various water conservation measures taken up at Seshasayee Paper and Boards (SPB) which resulted in conservation of considerable amount of fresh water.

INTRODUCTION

With the growing population there is an increase in demand for essential commodities. To meet this demand industries are expanding and multiplying. For any industry, besides raw material, water and energy are two other essential requirements. As the industry grows the requirement of raw materials and other essential inputs increase.

In the case of Paper industry, where the growth

rate is expected to be around 6%, an additional 50 million cu.m of water will be required for the incremental production every year. The quantity of effluent discharged being directly dependent on consumption of fresh water, a Herculean effort is required from the industry to contain the damage caused by the additional effluent discharge. Therefore, water

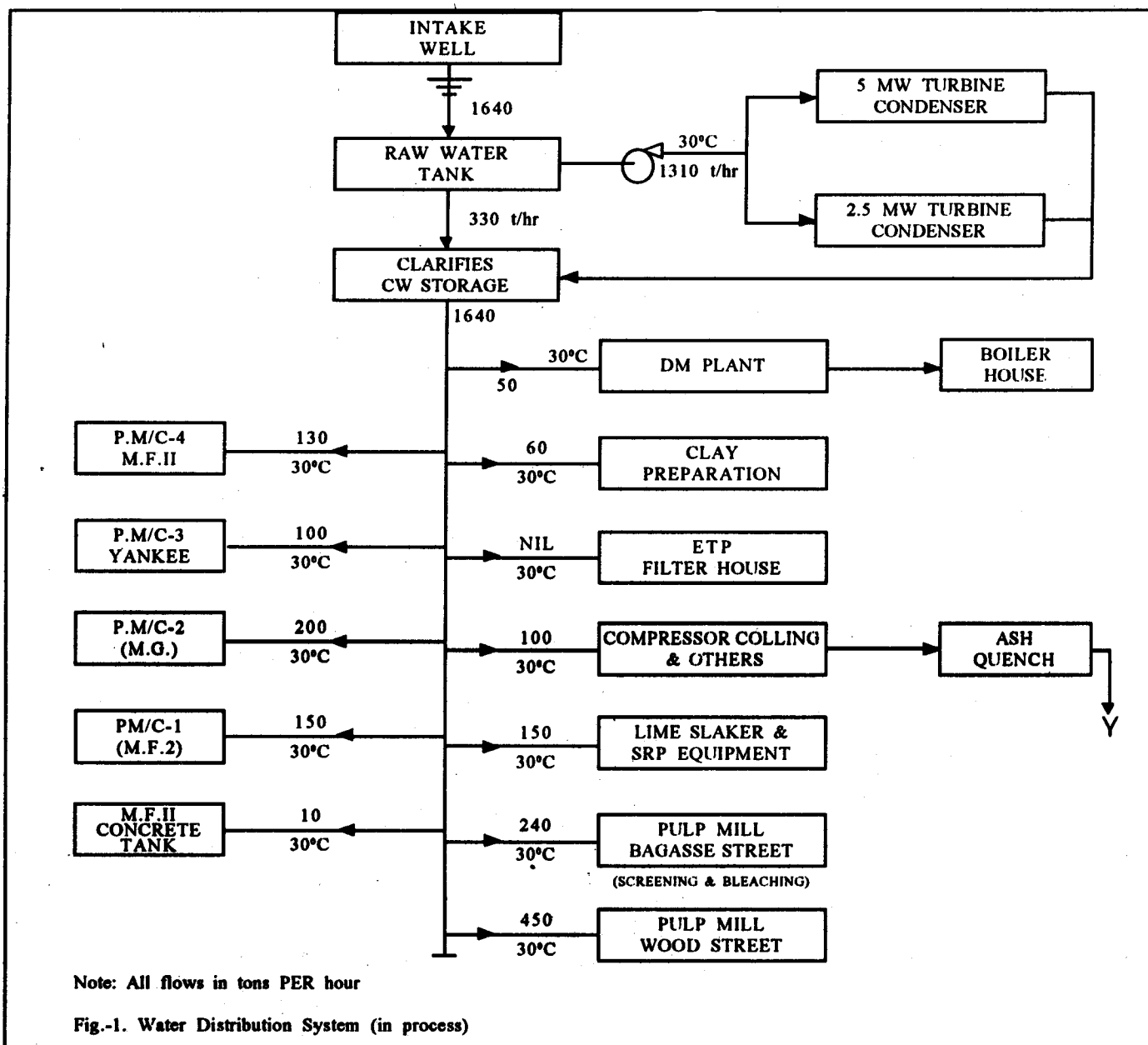
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conservation, in general is important for controlling the ecological imbalance caused by pollution.

Many industries in India do not give much importance to conservation of water. The focus is mainly on Production, Capital mobilisation, Profit making and other aspects which have an immediate impact on the bottom line of the company. Environmental issues like water conservation take a backseat. "Concern" for the environment rather than just "Awareness", should be there among these industries for minimising the impact of pollution on the environment.

The Ministry of Environment and Forests, Government of India vide notification No. 422 (E) dated 19th May 1993, has envisaged that the effluent discharge from large paper mills of capacity above 24,000 MT per annum must not be more than 175 Cu M per ton of paper produced.

In order to meet the targeted effluent discharge level as declared by Government of India, complete upgradation of processes as well as strengthening of in-plant control measures like recycling of waste water has to be adopted by the Mill. Such measures should aim to bring down the fresh water



consumption to around 200 Cu M per ton of paper produced. Presently Indian paper mills consume at an average of about 250-300 Cu M per ton of paper produced.

Generally, the reduction in water consumption for paper industry can be achieved by adopting following methods:

- * dry debarking methods
- * treatment of condensates by steam stripping and reuse in the process
- * use of efficient washing machinery
- * reuse of bleach plant effluent in various pulp washing systems
- * white water recycling for paper machines, pulp washing and waste paper processing plant
- * use of efficient fiber recovery system

At SPB, several measures were implemented in various stages of pulp and paper making process with an aim to conserve a significant quantity of fresh water. Stage wise water conservation measures starting from raw material processing stage to paper manufacturing stage being adopted at SPB are described in detail in this paper.

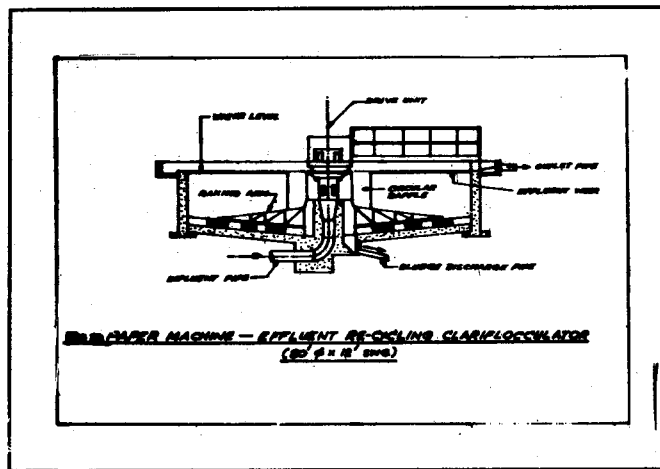
AN APPROACH TOWARDS WATER CONSERVATION

SPB is situated on the bank of Cauvery river. Raw water from river is drawn through an in-take well. The treatment for process water involves a single stage clarification and chlorination. The flow diagram of mill wide water distribution system is presented in fig.-1.

The water consumption of SPB prior to 1982 was around 400 Cu M/t of paper. After implementing various water conservation measures the consumption was brought down to 230 Cu M/t of paper.

PER WATER CONCEPT

In the early eighties the mill was just introducing additional bagasse pulping facility, waste



paper processing plant etc. It was therefore felt that the mill should implement a scheme which would ensure immediate benefit by way of reusing of machine back water.

For this purpose, a Paper machine Effluent Recycled (PER) water system was developed wherein the effluent from paper machine and filtrate of final washer bleach plant were taken through separate drains to one of the water clarifloculators which was converted as PER clarifier (Fig.-2) and the clarified filtrate from PER clarifier was reused within the mill at identified locations.

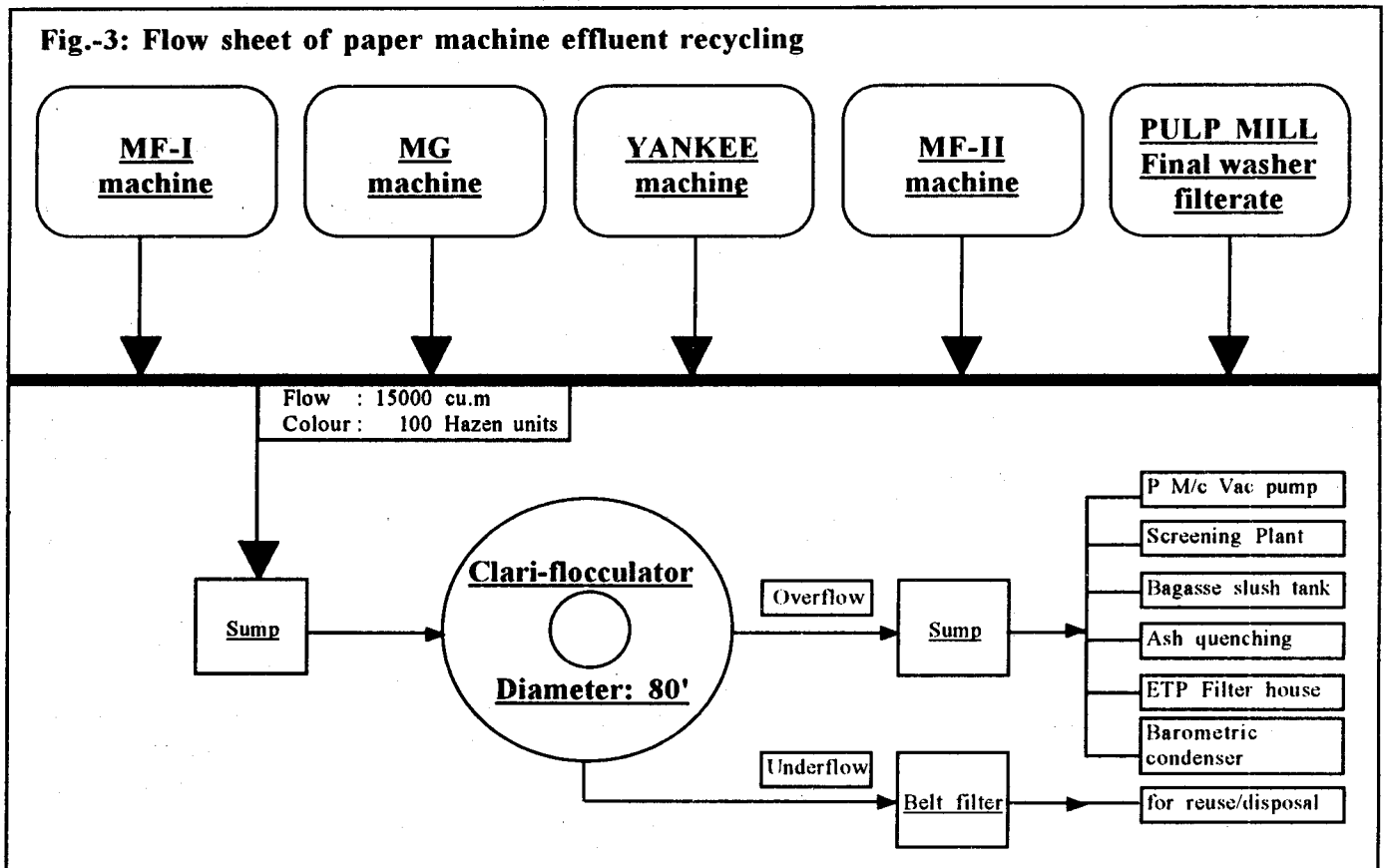
The clarifloculator has a diameter of 80 feet and 12 feet side water depth and a treatment capacity of 750 Cu M/hr, with an effective retention period of 2.5 hours. The suspended matter which settles at the bottom is drawn out at 1.5% consistency and filtered on a rotary belt filter. The clear supernatant back water as well as recovered fiber

Table-1

Characteristics of PER Water

| Particulars | Unit | PER Clarifloculator | |
|-------------------------------|------|---------------------|----------|
| | | Feed | Overflow |
| Colour | PtCo | 90-110 | 85-100 |
| pH | -- | 6-7.3 | 6-6.7 |
| Total suspended solids | ppm | 900-1000 | 50 |
| Organics | ppm | 600-800 | 150-200 |
| Hardness as CaCO ₃ | ppm | 120-260 | 100-240 |

Fig.-3: Flow sheet of paper machine effluent recycling



are reused in the process (Fig.-3). The characteristics of feed and overflow of PER Clariflocculator is presented in table-1.

It is a well known fact that, pulp mill and paper machine sections are the two major areas consuming largest quantity of water in the paper making process. Initial efforts were targeted towards conservation of water in these two sections by reusing waste water to bring down the fresh water consumption. At several points in these two sections, a considerable amount of fresh water was replaced either by clarified paper machine effluent recycled (PER) water or bleach plant effluent water or cooling water or by water from fiber recovery system. The use of PER water plays key role in this water conservation scheme.

WATER CONSERVATION MEASURES UNDERTAKEN AT SPB

The strategy adopted for water conservation consisted of

Studying the water consumption pattern for each section and sub-section

Analysing the water quality requirements for each process

Exploring avenues for recycling waste water at source

Use of PER water at places where water quality is not a stringent requirement

A brief description of some of the water conservation measures which were implemented are mentioned below:

(A) Fiber Preparation Plant

i) Chipper House:

Wood logs are washed with water to remove sand and other impurities before being fed into the chippers. Previously fresh water was used for cleaning. At present clarified PER water is used. This has resulted in a saving of about 100 Cu M/day of fresh water.

ii) Bagasse Handling and Preparation Scheme (BHPS):

In the fiber preparation plant Bagasse is slushed with water. Mechanical agitation during slushing removes water soluble matters and also loosens the pith content in it. The slushed bagasse is dewatered in an aqua-separator. The filtrate from aqua-separator is taken to side hill screen where pith is separated and filtrate is reused in the bagasse slush tank.

Effective reuse of this filtrate has resulted in a saving of about 7000 Cu M of fresh water per day.

(B) Pulping and Bleaching Plant

i) Pulp washing process:

The overflows from seal tank, rich water tank, excess saveall clarified water, etc. are collected in a separate tank and used in pulp mill in thickeners, washer repulpers and dilution in pulp screening.

The screened pulp thickener back water is also being reused to the maximum extent possible in pulp mill area. This resulted in reduction of about 7000 Cu M of fresh water per day.

ii) Bleaching Process:

A system for reuse of chlorination stage back water in wood street was introduced by which the chlorination stage back water is used for vat dilution of chlorination stage and at final stage of unbleached bagasse pulp washing process. Previously this back water was drained to the effluent sewer. As a result of which not only 3000 Cu M of fresh water is saved per day but also it reduced the pollution load in effluent.

In bleach plant, by adopting counter current washing, a reduction in consumption of fresh water of about 5500 Cu M per day was achieved.

(C) Paper Machine

The saveall clarified water & paper machine wire shower water are collected in a separate tank and it is being used for couch pit dilution and machine pulper dilution during sheet breaks. In paper machine section the clean back water, namely, wire pit water from the machine is collected in separate tank and

used in tower dilution, wire shower for bleach plant filters, waste paper processing plant and so on.

(D) Soda Recovery and Boiler Section

Previously fresh water was used for barometric condensers. Now PER water is used. This replaces about 4000 Cu M of fresh water per day.

Previously fresh water was used for ash quenching. Now PER water is used. This replaces about 1000 Cu M of fresh water per day.

Cooling water from cascade and ID fan etc. used for dilution of milk of lime slurry. About 1200 Cu M of fresh water is conserved.

Besides the above important areas, in other areas also water conservation scheme has been implemented replacing fresh water by clarified PER water as detailed below.

| Area | Water conserved, Cu M/Day |
|--|---------------------------|
| a) Paper Machine vacuume pump sealing | 5000 |
| b) Effluent treatment plant filter house for cloth washing, vacuum pump, showers, etc. | 1000 |
| c) Fire fighting water used for spraying bagasse stacks to avoid fire hazards | 500 |
| d) Sprinkling on roads to control dust emission in mill surrounding area | 100 |

CONCLUSION

Sustained efforts at SPB have resulted in considerable reduction in the quantity of fresh water consumed. However even this reduced quantity is high and therefore continuous efforts are being made to reduce water consumption further. These include

Bench marking water consumption patterns for each section/sub-section against the best in the industry

Setting up of "Water conservation and Energy management" committee to identify and implement water conservation measures

Apart from the above SPB has also given a thrust to environmental consciousness, by including it in the company's stated "Quality Policy".