

# A Judicious Water Utilisation At An Integrated Pulp & Paperboard Mill

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## ABSTRACT

Water use and its reduction has become a major focal point for pulp and paper mills around the world. Concern for water conservation, adoption of environmental laws and forced environmental conditions have driven many pulp and paper mills in the country to reduce plant water usage. Adoption of Best Available Technology and Best Management Practices with more environment friendly process, viz. oxygen delignification and elemental chlorine free (ECF)/Ozone bleaching coupled with complete recycling of white waters in paper machines and adoption of energy efficient process, plant, and machinery resulted in water conservation at ITC-PSPD. Unit : Bhadrachalam to 44 m<sup>3</sup> /T. of production. Still efforts are on to reduce water consumption further to below 30 m<sup>3</sup> /T. Growth and development in harmony with environment has always been its approach. With this concept only, water conservation efforts are getting its boost.

### Introduction

Paper mills use water as a medium to transport fibers, energy and chemicals during the production of paper. The volume of water used per ton of paper produced depends on several factors including the types of products, the equipment used, the configuration or arrangements of the equipment, the production process, the operating conditions and parameters. Water use and its reduction has become a major focal point for pulp and paper mills around the world. Concern for water conservation, adoption of environmental laws and forced environmental conditions have driven many pulp and paper mills in the country to reduce plant water usage. Water conservation is defined as "any action that reduces the amount of water withdrawn from water supply source, reduces consumptive use, reduces the loss or waste of water, improves the efficiency of water use, increases recycling and reuse of water, or prevents the pollution of water". Based on this definition, Bhadrachalam Unit, is making an ongoing, continuous effort for water conservation.

### Steps For Successful Water Conservation

The following are the few steps which can help in attaining the desired water conservation levels.

#### **a). Water management plans must be**

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**part of an integrated approach that examines how changes in water use will impact all other areas of operation.**

**b). Water conservation involves two distinct areas: TECHNICAL AND HUMAN.**

The technical side includes collecting data from water audits and installing water- efficient fixtures. The human side involves changing behaviors and expectations about water usage and "the way things should be done." Both areas must be addressed for a water conservation program to succeed.

**c). A water conservation plan depends upon accurate data.**

Before water saving measures are implemented, a thorough water audit should be conducted to determine where water is being used. Then, water use can be monitored to track conservation progress.

**d). A successful water conservation plan follows a logical sequence of events.**

Implementation should be conducted in phases, starting with the most obvious and lowest cost options.

**e). An effective plan examines not just how much water is being used, but how it is used and by whom.**

When analyzing a water audit, the next question to be asked : "Can this process be done as well or better using less of water?"

**f). The quality of water needed should be matched with the application.**

Paper mill applications do not require the use of potable water. Whenever possible, substitute recycled water used in one process for use in another.

**g). Setting specific water conservation goals.**

A realistic and achievable water reduction targets to be set and a team to be made responsible to achieve the target in time.

**h). The true cost of water must be considered when conducting a cost analysis.**

The true cost of water is the amount on the water bill plus the cost to heat, cool, treat, pump, and disposal.

### **Water Conservation Measures Adopted At Bhadrachalam Unit.**

The water source for Bhadrachalam unit is from river Godavari. Daily about 60,000 65,000 Cu..M. of water is drawn. As of now, the unit has three Paperboard making machines of total capacity : 2.352 Lakh TPA, Paper making machines of total capacity : 1.223 Lakh TPA and two fiber lines of total capacity : 2.35 Lakh TPA., two Chemical Recover Boilers of total solids firing capacity of 1575 TPD. , four AFBC Coal fired boilers and one multi fuel boiler of total steam generation capacity of 400 TPH at 64 ata. Pressure with Co-gen power capacity of 83.2 MW. The driving forces for water conservation are;

Concern for resource conservation, CREP(Corporate Responsibility for Environment Protection) conditions and added with State Pollution Control Board norms for water use. The present specific consumption of water in pulping and paper production has been drastically reduced to 44 Cu.M . per tonne of production . The reduction of specific water consumption over the years is shown in Table-1. From the table it can noted that the specific water consumption ,which was 100 Cu. M per Ton of production in the year 2000, was brought down step by step to 48 Cu.M per Ton of production by the year 2010. This drastic reduction in specific water

conservation was possible by adopting the water conservation methods. Apart from water recycling in paper machines, over the past three years, unit has achieved a water saving of 22,500 Cu.M. per day, through 66 water conservation projects. The present specific water consumption in Pulp mill and Paper machines is shown in Table-2.

#### Steps Taken For Water Conservation

A sustainable approach to water management and conservation of water is good for the Paper industry, good for the environment, and is simply good business.

The following steps are being adopted to achieve the water conservation.

- i) **Periodic Technology Up Gradation**
- ii) **Educating the Employees and Involve them**
- iii) **Know Your Water Usage By Audits**
- iv) **Identify & Fix Leaks**
- v) **Use Back water For Floor Cleaning**

#### Periodic Technology Up Gradation

Most of the Indian Paper mills are dependent on conventional kraft pulping using stationery vertical digesters and use of Chlorine and Hypo for pulp bleaching. This type of pulping and bleaching systems are highly water intensive and releases Dioxins, which are harmful to the environment. Unit Bhadrachalam, periodically up graded its bleaching system and installed Super Batch Pulping system. presently follows ECF/Ozone bleaching, which is environment friendly and uses very less quantity of water. Ie: about 23 Cu. M. of water per tonne of pulp . Apart from this, initiations are taken while designing the new Paper Machines, to consume less than 15 Cu.M. of water per tonne of product and today their water consumption is below 10 Cu.M.

#### Highlites Of Few Case Studies on Water Conservation Steps Taken Up In Paper Machine Area

##### ● White Water Tower:

A white water tower of capacity 1500 m<sup>3</sup> has been constructed to collect the entire back waters from all the paper machines and use it during the paper break for dilution purpose.

##### ● Central Collection Of Sealing/Cooling Water:

Sealing waters from all the equipments in the paper machine areas are collected and used for cooling purposes instead of using fresh water.

##### ● Three Split Disk Filter:

In paper machine-6., rotary valve of two splits has been changed to three splits, so that 1000 m<sup>3</sup>/day clear water could be generated, which can be used in lubrication showers.

##### ● Installation of PETEX FILTER:

In paper machine-1., Petex filter has been installed along with KROFTA, which has saved about 2500 m<sup>3</sup>/day.

#### Educating The Employees And Involve Them

- Build understanding among

TABLE 1.

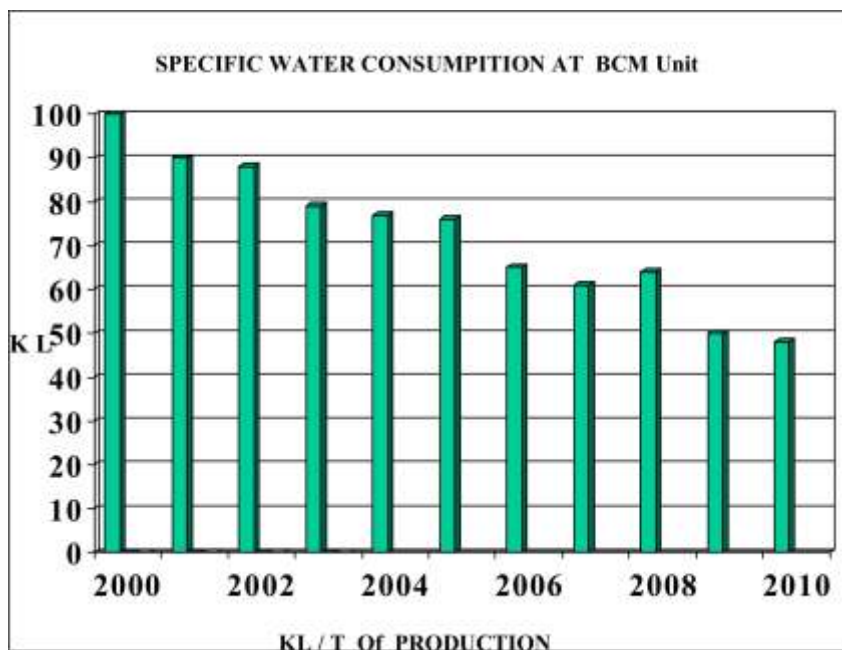


TABLE 2.

#### SPECIFIC FRESH WATER CONSUMPTION (ACHIEVED) BY PULP & PAPER PRODUCTION UNITS AT Bhadrachalam

S. No.	MAJOR WATER CONSUMING UNIT	RATED PRODUCTION CAPACITY ( TPD )	EXISTING SPECIFIC WATER CONSUMPTION ( m3/T )
1	PULP MILL (BLOWN PULP)	800	30.24*
2	PAPER MACHINE-1 (BOARD)	330	12.06
3	PAPER MACHINE-2&3 (PAPER)	90	24.51
4	PAPER MACHINE-4 (BOARD)	480	10.69
5	PAPER MACHINE-5 (BOARD)	350	10.79
6	PAPER MACHINE-6 (PAPER)	450	8.39

# Educate Your Employees

Educated employees will be better able to identify problems and think innovatively about ways to conserve or reuse water within the facility.

THE FOLLOWING WATER CONSERVATION SCHEMES SUGGESTED AND IMPLIMENTED BY THE EMPLOYEES IN THE YEAR (2010 -11).

	<u>SAVING</u>
1. In P/M.1.To use more of back water during ABK/DKL run	- 50 m <sup>3</sup> /d
2. In P/M.1. Usage of excess Krofta water	- 15 m <sup>3</sup> /d
3. In P/M.1. Use of Krofta water for foam killing	- 80 m <sup>3</sup> /d
4. In P/M.5. Diversion of cloudy water to white water tower	- 150 m <sup>3</sup> /d
5. In P/M.6. Recovery of refiner sealing water	- 216 m <sup>3</sup> /d
6. In Pulp mill recovery of sealing water	- 80 m <sup>3</sup> /d
7. In Utilities use of cooling tower blow downs	- 200 m <sup>3</sup> /d
8. In SRB recycling of evaporator condensate	- 600 m <sup>3</sup> /d
9. In pulp mill use of fowl condensate	- 840 m <sup>3</sup> /d

Fig-1.

employees and co-workers. Make employees and co-workers aware of water scarcity issues and the impact of water conservation practices. Conserving water not only saves water, but money too, on both operation and production costs.

- Educated employees will be better able to identify problems and think innovatively about ways to conserve or reuse water within the facility.

## Know Your Water Usage By Audits

- Read your water meter readings. By reading your water meter readings daily, weekly or monthly you can record your average water consumption. Establish a baseline use. Examining water Cess bills can help in understand historical water use.
- Service of external auditors are very essential to know the exact water consumptions and they also suggest the methods to conserve.
- Services of National Productivity Council, C I I and M/S. Metso are utilised to conduct water audits.

## Identify And Fix Leaks

The easiest way to identify when leaks occur is to know when your use rises above a base level for your operations. Once you have identified that there may be a leak, you need to take steps to locate and repair the leak.

- Conduct regular inspections of equipment or areas where leaks could occur, like pipe-work joints,

connections and fittings. Indications include dampness, rust marks or swelling boards. Significant leaks can often be detected by listening in the absence of other noise.

- Check equipment. Worn, old or poorly maintained equipment can waste significant amounts of water.
- Learn more about applicable technologies.

## Use of Back Water For Floor Cleaning & Gardening

- Instead of using fresh water for floor cleaning, it is better to use back water.
- Use brooms, squeegees and dry vacuum cleaners to clean surfaces before washing with water.
- Use washing equipment that has aerated spray nozzles equipped with shut-off valves.
- Fit hoses with high-pressure, low-volume nozzles with shut-off valves.
- Sweep paved areas.
- Use treated back water for gardening.
- Reduce the frequency of cleaning external equipment and floors where possible.

## Treatment Of Waste Water And Use For Irrigation

As a part of reuse of water for productive use, the combined mill waste water is treated biologically by adopting Conventional Activated Sludge process and MBBR (Moving Bed Biological Reactor) systems and

treated beyond the statutory limits of discharge into water course and discharged for irrigation purposes . Aquatic life is also grown in this water to prove that this treated waste water is safe to be let into the water course. Nearly 80 - 100 % of waste water is utilised by farmers to raise two good crops annually, around the mill in an area of 1200-1500 acres of land. The crops grown are paddy, chilies and cotton. Some of the progressive farmers have switched over to grow eucalyptus plantations also. To study the impact of use of biologically treated waste water on soil and crops, services of Andhra Pradesh Agricultural University is being utilised.

## Conclusion

The full support of top Management , both ideologically and financially , is essential to the success of any water conservation program. Although water conservation programs are a proven way to save money and resources in the long term, program require an initial investment. In addition,water conservation measures can also impact ongoing facility operations. Without Management supportand the necessary resources, a comprehensive water conservation plan is virtually impossible. At ITC-PSPD. Unit: Bhadrachalam, Water conservation will continue as a part of continuous programme and, aiming for the further reduction in specific consumption of fresh water to below 30 Cu.M. per tonne of product with in few years by further motivating the employees and judicious investment.

## Acknowledgement

The author acknowledges his sincere thanks to the management of ITC PSPD Unit: Bhadrachalam, for providing the information and permitting to present this paper at **IPPTA WORKSHOP** , NOV.2011.