

OPPORTUNITIES FOR REDUCTION IN FRESH WATER CONSUMPTION, RECOVERY AND REUSE



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SUMMARY

Water plays a major role in paper making in paper industry. Pulp mill consumes a major portion of the water in paper making. With depleting water resources & failure of monsoons water has become a rare commodity for consumption. It is imperative to reduce the water consumption, so that water can be conserved for our future generation. Efforts were taken in TNPL to reduce water consumption by reduce reuse and recycling methods. This paper highlights on CB ECF bleach plant filtrates recycling coming close to ZLD (Zero Liquid Discharge)

INTRODUCTION

TNPL was established by Government of Tamil Nadu in the early 80's for manufacturing of Newsprint, writing & printing paper with an initial capacity of 90,000 TPA. TNPL enhanced its production to 4, 00,000 TPA after its mill expansion plan in 2010. The pulp demand for the 3 paper machines are satisfied by three pulping streams Hard Wood Pulp, Chemical Bagasse Pulp & De-inked Pulp. This paper mainly highlights on reduction in water consumption in Chemical Bagasse pulp mill.

LITERATURE REVIEW

TNPL is the major consumer of bagasse an agro residue for manufacturing of paper. TNPL consumes 10 Lakhs tonnes of bagasse per annum for paper making. Water is being used in bagasse pulping plant for wet washing, cooking, Brown stock washing, screening & bleaching. This paper mainly highlights on reduction of fresh water consumption for our chemical bagasse pulp mill.

Wash water from Bagasse wet washing plant is clarified in Back Water Clarification plant. Back water clarification plant comprises of Rotary screen (5 Nos), Pith presses (4 Nos) & screw press (4 Nos). Back water from wet washing plant is filtered in rotary screen & then pressed in pith presses to an outlet consistency of 20%. Pith press outlet pith is fed to screw press where it is further dewatered to 40% consistency. Dewatered pith at 40% consistency is fed to boilers for firing. Rotary screen filtrate is sent to a settling tank comprising of 3 compartments where Settling of pith & sand takes place. Clarified water from settling tank over flows to the clarified water storage chest which is being recycled to wash bagasse. Hence there is no-use of fresh water for bagasse washing. The bagasse wash water from bagasse pile & wet washing plant is used for Bio-gas generation.

Bagasse from Plug Screw Feeder is cooked in continuous digesters and then sent for washing & screening. TNPL consists of two chemical bagasse washing & screening plants. One is the conventional washing & Screening plant using rotary drum washers and the latest commissioned plant consist of hot stock screening & washing with ODL (Oxygen Delignification). Both the plants are interlinked and the unbleached pulp is sent for single street ECF Bleaching.

Washed bagasse is further dewatered in plug screw feeder. In plug screw feeder evaporator process condensate is being used for continuous flushing to avoid plugging of throat, thus avoiding usage of fresh water.

In the conventional washing plant countercurrent washing takes place. Hot water is being used in the final Brown Stock Washer for washing the pulp. This Hot water was replaced with process condensate from evaporator, thus reducing fresh water consumption by 2880m³/day. (Figure.01)

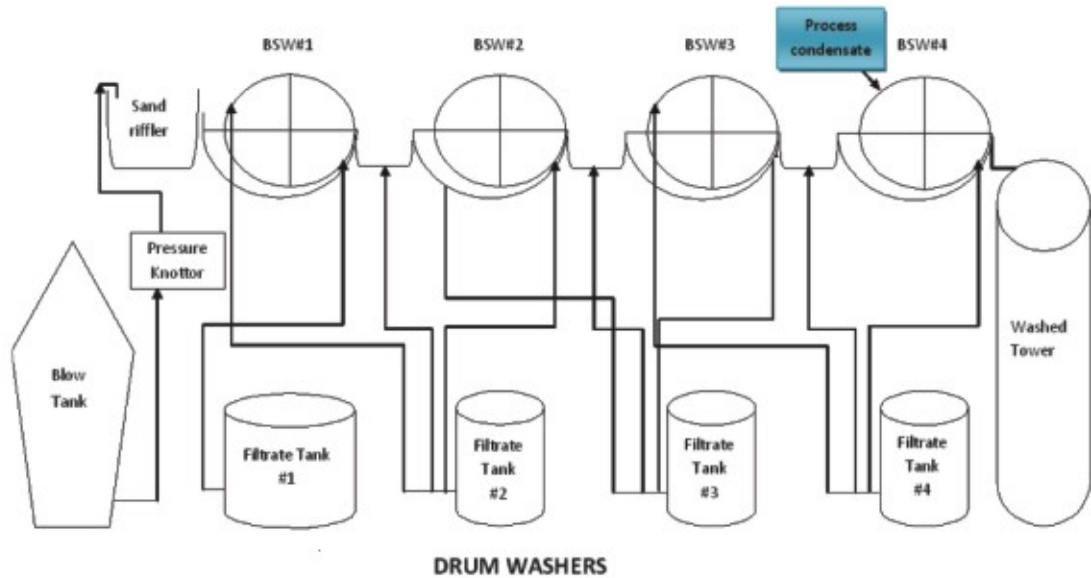


Figure No. 01

In the screening plant MD cleaners are erected before primary & secondary screen. Process condensate is being used for elutriation in MD cleaners instead of fresh water, thus reducing fresh water consumption by 2400m³/day for 5 MD Cleaners (Figure.02).

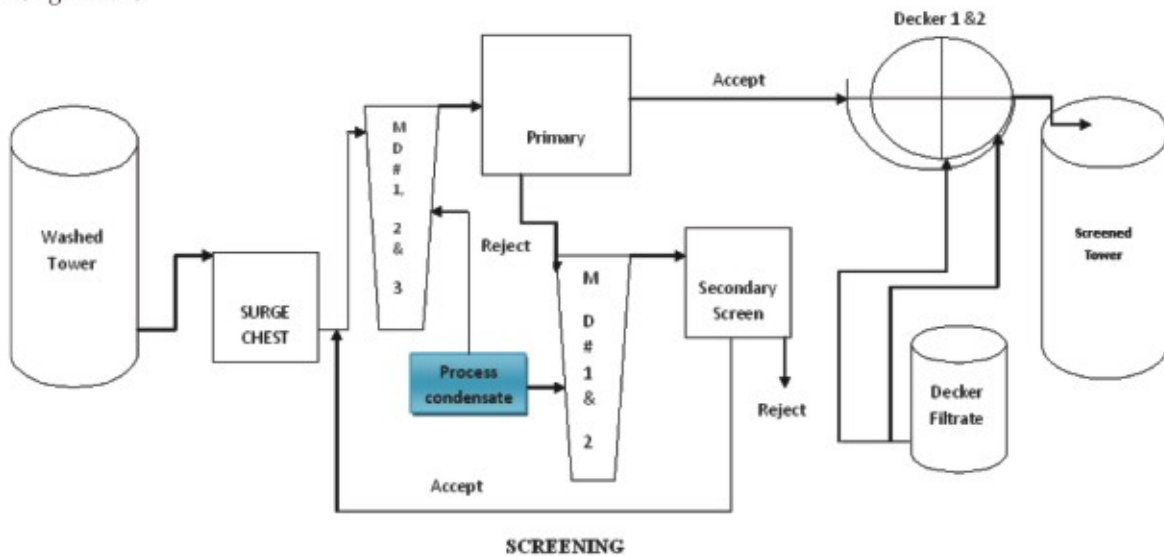


Figure No. 02

Screened pulp from both the plants is sent to ECF bleaching. Bleach plant capacity is 500 TPD of bleached pulp. The bleaching sequence followed in CB-ECF plant is D0-EOP-D1.

TNPL has made a major stride in reducing bleach plant effluent load. As a first step D0 filtrate about 960m³/day is being used for POW#2 outlet pulp dilution. This recycle has not only reduced hot water consumption but also sulphuric acid consumption (Figure.03).

TNPL has made a major breakthrough in completely reusing EOP filtrate in our bleaching sequence. EOP filtrate in effluent channel will increase sodium content, color, TSS & COD. EOP filtrate is being used as wash liquor in first twin roll press POW#2 in the bleaching sequence. It is also added at D0 press outlet standpipe for dilution instead of Hot water. EOP filtrate generation will be around 3360m³/day. Initially while substituting EOP filtrate for hot water we had problem of choking due to pulp carry over. This was solved by filtering EOP filtrate in liquor filter. This filtered EOP filtrate was taken for dilution. This is distributed to Alkaline liquor filter sprays 240m³/day, POW#2 wash liquor 720m³/day and D0 press stand pipe dilution 2400m³/day. hot water was earlier used for POW#2 wash liquor & D0 press stand pipe dilution. This has been replaced with EOP filtrate (Figure. 03 & 04)

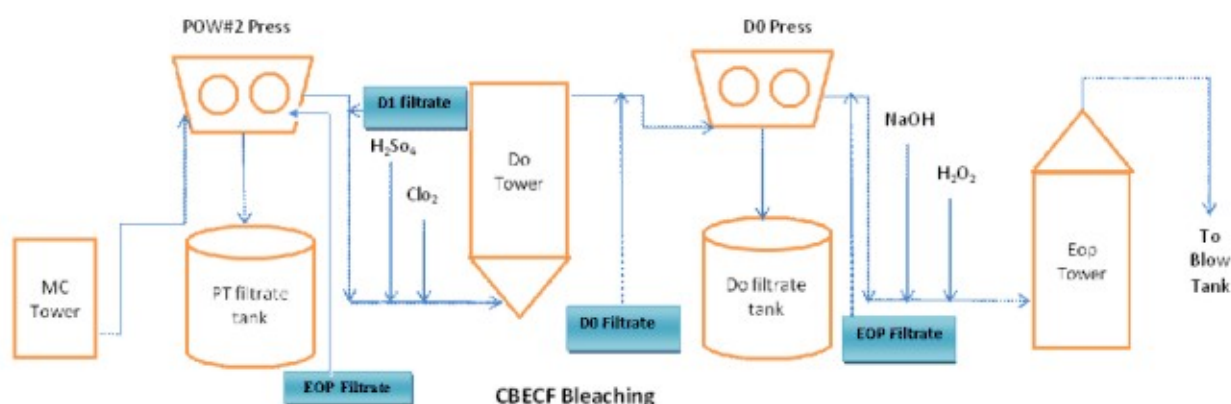


Figure No: 03

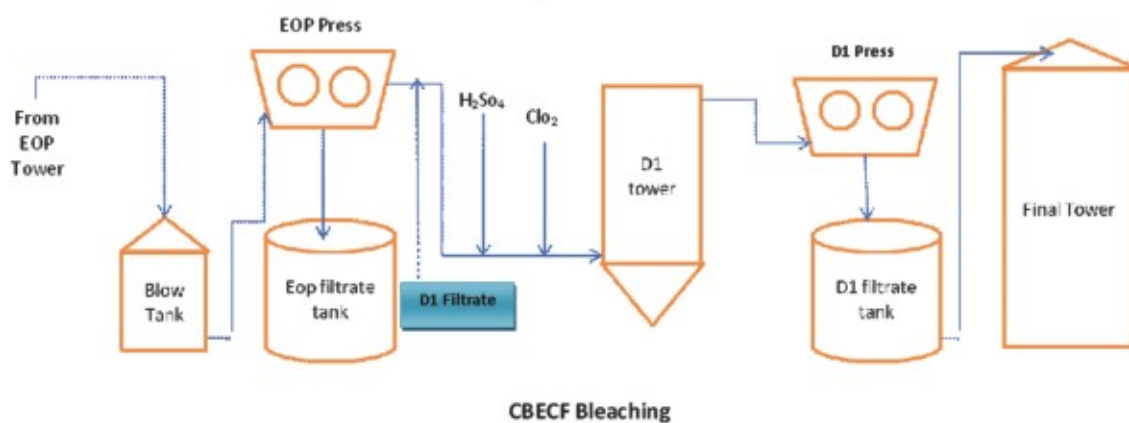


Figure No: 04

As mentioned the data's of Bleach plant filtrate recycle has been tabulated in Table No.01. Due to the above efforts our effluent volume has substantially reduced only D0 filtrate (50%) is let into the effluent.

| S. No. | Bleach plant filtrate generation | Bleach plant filtrate recycled |
|--------|--|--|
| 1 | D0 filtrate - 2760 m ³ / day | D0 filtrate - 1080 m ³ / day |
| 2 | EOP filtrate - 3360 m ³ / day | EOP filtrate - 3360 m ³ / day |

Table No. : 01

RESULTS AND CONCLUSION

As discussed water plays a major part in paper making & it is our responsibility to save water. TNPL has taken major efforts in saving water & recycling without affecting our process. The specific fresh water consumption has reduced to 15.5 m³/T of pulp from 55 m³/T of pulp and also CBECF effluent TSS has reduced to 550ppm from 2100ppm. Water is being used for hydraulic oil cooling in twin roll press. After oil cooling water is being sent to water treatment plant for reuse (1200m³ / day) On mill wide scale we are treating our effluent and this treated effluent is used to irrigate agriculture lands (Figure 5 & 6).

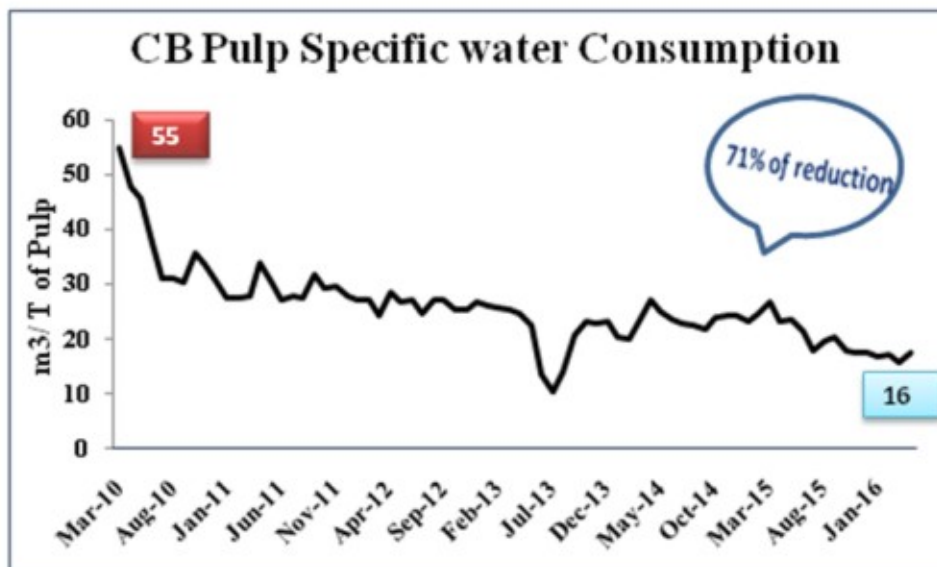


Figure: 05

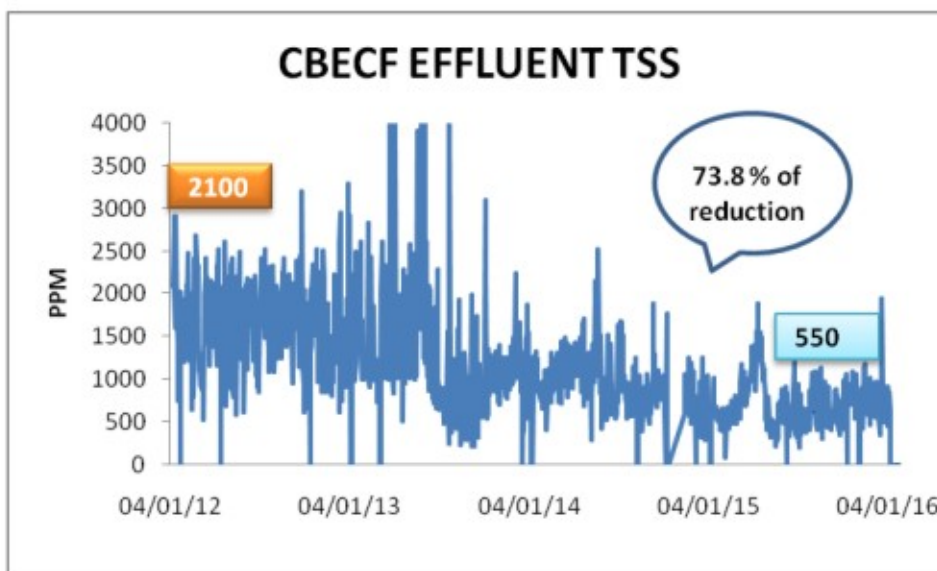


Figure: 06