Environmental Management at Ballarpur Industries Ltd, unit - Shree Gopal

Shamim Ahmad, Anami Saran, V.P. Saxena, K.D. Prasad and S.S. Arora

Pulp and paper industry is one of the major polluted industry in the world. Rigid environmental compulsions in the industry have forced to look for drastic measures to recycle natural resources by adopting eco-friendly practices. Environmental protection is no longer a new issue now. Right from Government up to the common public environmental degradation has become a issue of concern. Of late, Central Pollution Control Board has issued another directive in the form of Corporate Responsibility on Environmental Protection (CREP). To keep pace with the changed concept, Ballarpur Industries Ltd, unit Shree Gopal, Yamuna Nagar, one of the major Paper mill in the North India region, has already implemented or in the process of implementation under environmental management system. AOX, considered to be one of the major toxic chlorinated compounds, is very less i.e. 0.7kg/MT as compared to the present stipulated norms in outgoing treated effluent. The treated waste water being discharged is extensively used in the in-house gardening. Local formers are also educated to use the treated effluent for irrigation purpose. The treated effluent quantity has decreased considerably over the last 5-6 years. We have taken lot of measures to bring down fresh water consumption from 223 to 120 m³/t of paper. ESP in recovery boiler and Lime reburning process are in the operation. The above contributes to improvement of Mill's environmental performances.

INTRODUCTION

Environmental conservation or preservation is a major task before all world. Though, we have done many things for the preservation of the environment as well as for improvement of environmental performance and still many things are yet to be done (1). Environmental management system adopted in industrial units covers all spots of pollutant, waste materials, ecology, recycling of rejected products, noise, odors and other visual amenity (2). It also embraces energy, land conservation of natural resources and heritage. Naturally any environment friendly industrial plant is bound to respond to these problems positively. However, in all cases prevention of pollution demand the maximum attention (1).

Ballarpur Industries Ltd., Unit Shree Gopal Yamunanagar (Haryana)

The Indian paper industry uses a lot of fresh water for the production of paper. As against the international benchmark of about 50m³/t of paper, an average Indian mill uses about 200m³/t of paper. Recently, some units have had to suspend production due to water shortage. Water is mainly used for washing of pulp. The industry endeavor at adopting technologies that bring down the consumption of fresh water to less that 100m³/t of paper by 2006, which implies not only technological intervention but also daily regulation of water consumption in operations. As per CREP requirements by 2007, the large pulp and paper mills, installed before 1992 have to reduce their effluent discharge to less than 120 m³/t of paper (3). This stipulation coupled with the natural shortfall of fresh water has guided the industry explore efficient washing systems and systems closure by reusing various streams to reduce the total water consumption (4).

The recent change in the Indian paper industry has their genesis on the stringent environmental regulations stipulated by the chapter on corporate responsibility for environment protection. The provisions of the chapter (which has been adopted by the industry for implementation) have acted as growth drives for the Indian paper industry. The large paper mills, which account for a little more than one third of the total production, have adopted significant technology up-gradation programs that aim to reduce AOX emissions through chlorine dioxide bleaching. This move of the large-scale sector has been driven by the AOX emission limit of 1.5 kg/t of paper, which must technically be achieved in the year 2005. Since this emission limit is to be further lowered to 1.0kg/t of paper. It will impact the industry to adopt the state of the art ECF bleaching and

oxygen delignification technologies. In this paper, the activities completed for the protection of environment are discussed (3).

Solids waste is often called third pollution after air and water pollution. The principal sources of solid wastes are domestic, commercial, industrial and agricultural activities. Industrial activities alone generate about 85% of the total solids wastes (4). The disposal problem is getting many fold day by day, mainly due to stringent laws formulated by the legal authorities. It is encouraging that, today some of the industrial waste are utilized and recycled while others can be used as energy sources. However, it is seen that the inorganic part is creating disposal problem to a larger extent. Lime mud, which is an inorganic waste, is being generated by all large paper plants. Actions have already been initiated to install a Lime mud re-burning plant, so that lime mud disposal problem is reduced to minimum along with a minimum utilization of natural resources. It is also proposed that once the plant is commissioned, provisions will be there for burning non-combustible odour creating gases in the Kiln.

BILT, UNIT SHREE GOPAL - A BRIEF INTRODUCTION

The unit is an ISO 9001:2000 certified integrated pulp & paper mill, having 6 paper machines & manufactures 85000 MT/annum of various grades of writing & printing, industrial grades of paper & coated boards like Royal Executive, Sunshine super printing, Electrical grade, Ivory board & Black center board (BCB). The unit also has blade coater (state of art technology), which produces approx 15000 MT/annum of coated boards with captive power generation plant - two turbines (One 18 MWH & other 6.25 MWH). It has state-of-art pulp mill, DCS controlled, having CD-EOP-D1-D2 bleaching sequence.

The chemical recovery plant consists of evaporators, two recovery boilers (ABL & JMW) and causticizing plant. The plant has recovery efficiency of 96.3%

The unit has also full fledged state of the art effluent treatment plant based upon activated sludge process. It consists of primary, secondary and tertiary treatment along with aeration tank, thickener & sludge dewatering machine (Andritz filter press). It is the only paper mill in India having tertiary treatment in ET plant.

ENVIRONMENTAL MANAGER AT PLANT

Water conservation

Water has become a precious commodity. A scientific arrangement of water usage is warranted not only to save the resource but also to reduce the wastage of input chemicals. Improvements in pulping and paper technology have been focusing on ways of reducing the specific water consumption. With dwindling water resource availability, the mill is now taking regular measures to cope with situation since water is the major raw material for papermaking (6).

During the last six years, there is significant reduction in the water consumption. In 2000-01, the water consumption was 213 m^3/t of paper, which has reduced to 120 m^3/t of paper in 2005-06. This is the result of various steps taken over the period to reduce fresh water consumption.

Action taken to reduce water conservation

The major steps taken are given in table no. 1. and modified flow chart of recycling of machine backwater is given fig.1. The water consumption & effluent discharge patterns over the last 6 years are given in Fig 2 & 3 respectively.

Waste water management

Several treatment and control technologies have been developed to reduce wastewater or pollutant discharge to natural watercourse. The two major technology approaches are:

- Production process controls aimed at reducing wastewater volume and pollutant load discharge from the mill.
- Wastewater treatment technology or end- of -pipe treatment systems aimed at reducing discharge of pollutants contained in the water (7).

Both these approaches have been adopted by us, however, the process control system has been widely focused so that, the pollutants generated can be reduced at the point of generation itself. We have an effluent treatment plant having a

Table 1: Actions for water conservation

S.No.	Activity	Water Saving m^3/hrs
1.	Use of disc save-all effluent on wire showers & wash roll edges at all m/cs	75
2.	Reuse of water on all machines vacuum pump by passing through cooling tower	115
3.	Reuse of pope reel and compressor water to water reservoir	30
4.	Use of machine back water in cy% controller and pulp dilution at pulp mill	28
5.	Stopping of over flow of jet condenser pit and reduction of fresh water at chemical house by putting level controller & pump	35
6.	Use of special type gland packing in 20 pumps/refiners	10
7.	Replacement if existing MC pump with high efficient pump	15
8.	Reduction in use of gland cooling water by providing Macstar packing (36 pumps)	14
9.	Modification of feed pump to supply M/c 1,2&4 back water to brown stock washer	15
10	Thickener shower of m/c1&2 replaced with new showers	8

capacity of 2200 m³/hr. Introduction of tertiary clarifier in the treatment facility has significant effect in reducing the suspended solid, BOD and COD. A typical analysis of treated effluent along with norms laid down by Haryana State Pollution Control Board (HSPCB) is given in Table no 2. COD, BOD, suspended solids & AOX are much below than the specification laid down by HSPCB.

It may be noted that the colour of the treated effluent is very much on the lower side as compared to the Indian pulp & paper mills effluent. The treated effluent is utilized in the processes and irrigation. The excess effluent is discharged to canal.

Action taken to reduce pollutant load

- Low Kappa No. of the unbleached pulp - (18-20)
- Partial substitution with ClO_2 in chlorination stage (10%)
- Oxidative extraction reinforced with hydrogen peroxide at bleach pant.
- Increased the oxygenation in aeration tank/ biological process at ETP.
- Black liquor spillage control at pulp mill and soda recovery.

  At pulp mill two pit of 30 m³ each along with the tank of 250 m³ capacity in digester house installed and black liquor is recycles through stock chest (Fig 4).

  Inducting a pit of 50m³ capacity at soda recovery and at recycling back into the process along with the three pit from ABL and JMW recovery boiler (Fig 5).
- Recycling of Eop backwater for the dilution of CD washer pulp.
- Introduction of lime treatment in the combined effluent of pulp mill & recovery has resulted in 30% reduction in colour load and COD.

The characteristics of the treated effluent (avg. value) over the period of six year in regards to AOX, COD/ BOD, suspended solids, colour are given in figs 6, 7, 8 & 9 respectively

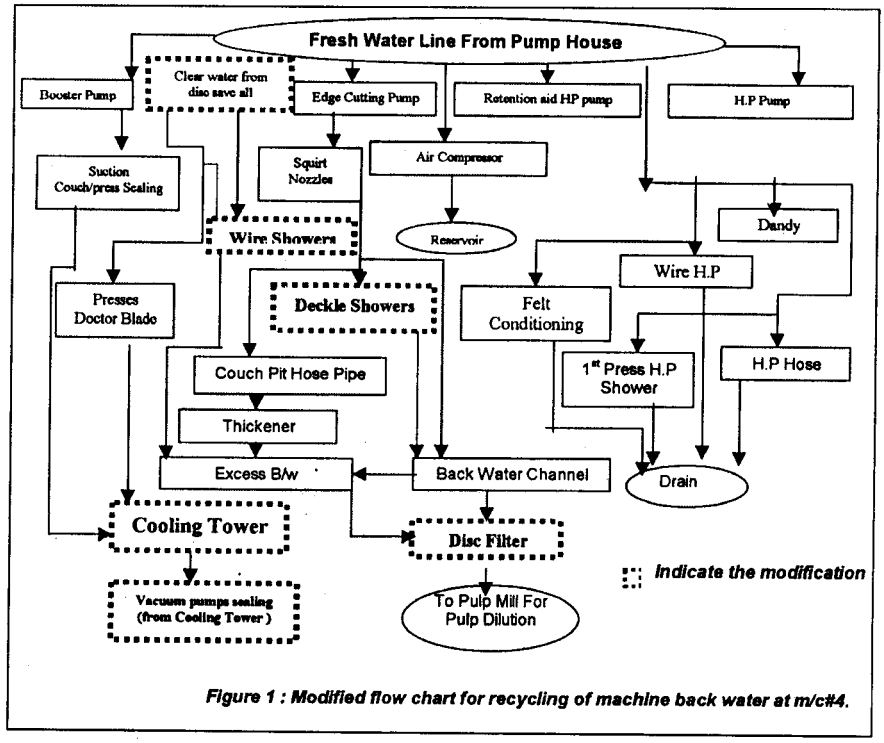

Figure 1 : Modified flow chart for recycling of machine back water at m/c#4.

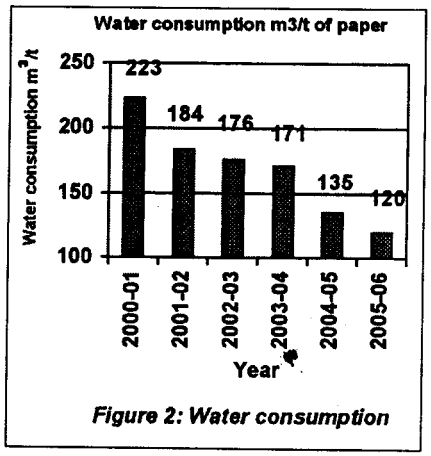

Figure 2: Water consumption

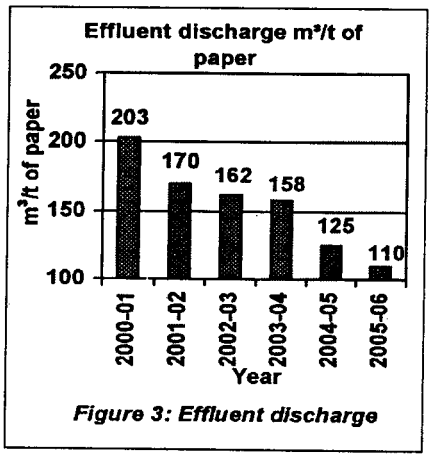

Figure 3: Effluent discharge

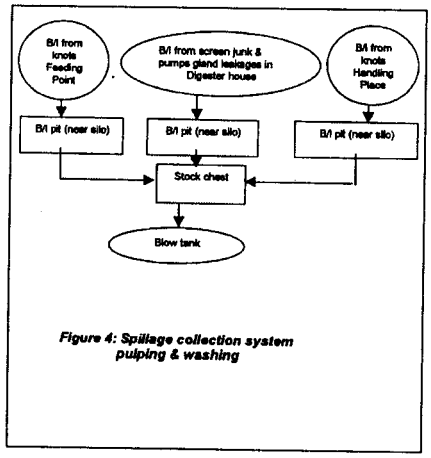

Figure 4: Spillage collection system pulping & washing

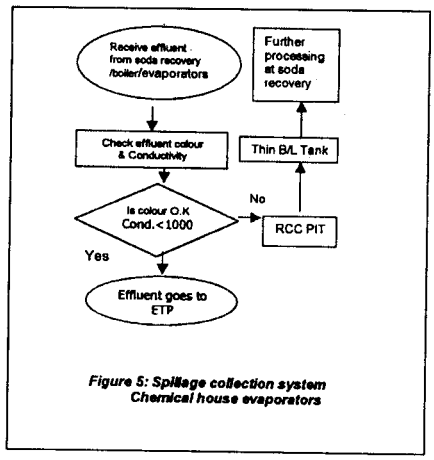

Figure 5: Spillage collection system Chemical house evaporators

Utilization of treated effluent

The treated effluent is used in the process at various locations. The major uses are

- Raw Material Wetting: 80m³/day
- Coal Ash Quenching: 1000m³/day
- Ejector Cooler at soda recovery evaporators: 400 m³/day
- Jet condenser of the evaporators: 1200 m³/day.
- Broke chest pump for gland cooling at 8 pumps: 100m³/day
- Chemical house pumps for gland cooling at 6 pumps: 80m³/day
- Gland cooling of all refiners: 200m³/day

The excess treated effluent is utilized for gardening in mills & colony (Fig 10). The approximate quantity is 1800 m³/day. It is also used for irrigation, as a demonstration to the local formers, to promote the use of treated effluent for paddy crops cultivation.

Lime mud management

In recovery plant, approx 100 MT of lime sludge (on dry basis) was generated every day. A rotary lime reburning kiln of capacity 60 MT/day of lime has been commissioned in Jan'05 and running successfully since then, though as per CREP lime kiln should be installed by Mar'07. The purity of lime in the reburnt lime is in the range of 78-80% with a make up of 10 % limestone. Lime kiln operation has improved over the period of time by employing the following measures. This has also resulted increased in recovery efficiency (Fig. 11). The lime mud generation and available Cao are given in Fig 12 & 13 respectively.

Action taken for process modification

- Stationary slaker installed in place of rotary slaker to increase retention time in existing rotary slaker
- Green liquor temperature increased by modifying the steam coil in causticizing plant.
- Temperature of hot water increased by using LP steam for lime mud washer.
- Control valve installed in wash water line to control Irregular & less wash addition at dreg washer.
- Sludge temperature raised by installation of steam coil in the sludge tank, sludge supply line and increasing hot wash water temp.
- Baffles introduced at the main inlet, 1st and 2nd field for uniform distribution of the Gas across the electrodes in ESP.

Table 2: Treated effluent characteristics

Particulars	Unit	Influent	Treated water effluent	HSPCB norms effluent
pH	NA	7-8	7.2 7.8	7.0-8.5
BOD	PPM	280-350	7-11	30 max.
COD	PPM	700-900	80-95	350 max.
Suspended solid	PPM	700-900	15-25	50 max.
AOX	kg/T Paper	1.2-1.6	0.63	<1.5

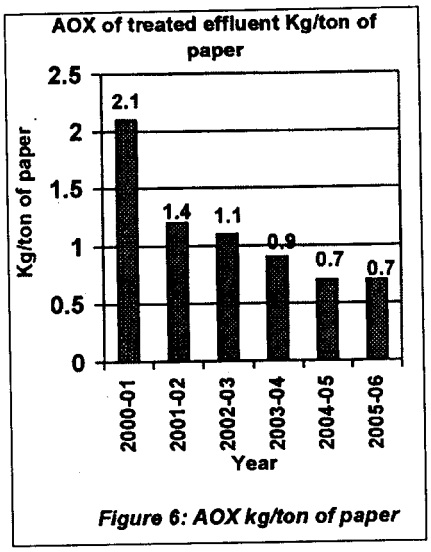

Figure 6: AOX kg/ton of paper

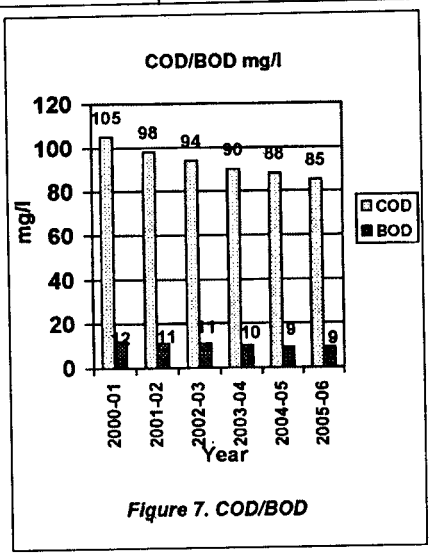

Figure 7. COD/BOD

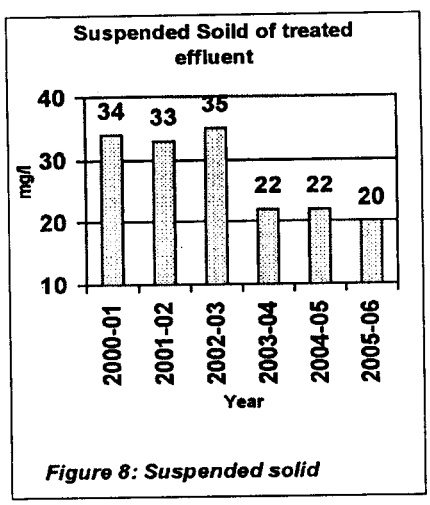

Figure 8: Suspended solid

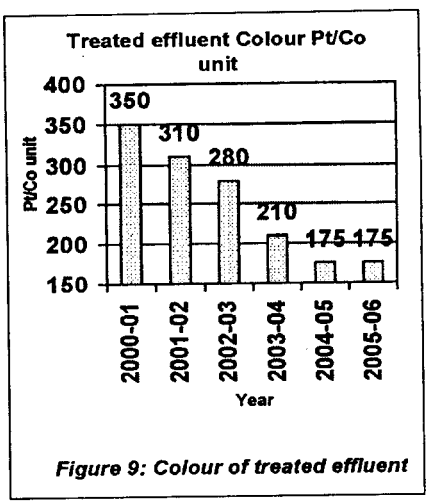

Figure 9: Colour of treated effluent

Figure 10: Treated effluent for gardening in mills and colony

Air pollution control measures

We have two recovery boilers namely ABL & JMW. Both are equipped with Electrostatic precipitator (ESP), Recently in June, 05, we have commissioned new ESP with the target emission level < 100 mg/Nm³. Current emission level is 80-130 mg/Nm³ and running quite successfully. ESP for JMW recovery boiler has also been upgraded and running satisfactorily. Suspended Particulate Matter (SPM) values for the last one-

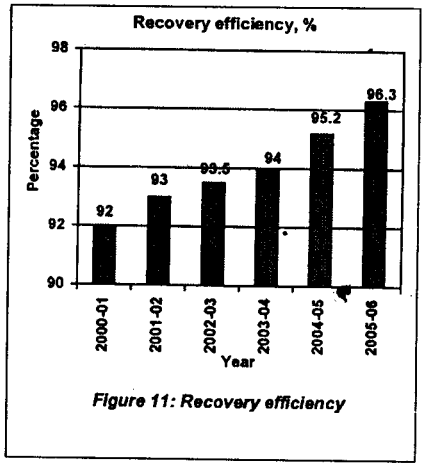

Figure 11: Recovery efficiency

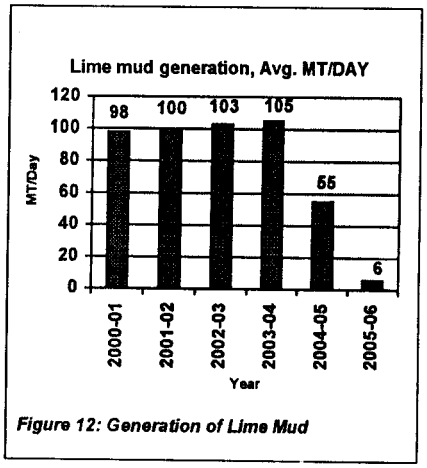

Figure 12: Generation of Lime Mud

CREP-STATUS AS ON AUGUST 06

Particular	Commitment	Status
AOX Discharge	<1.5 kg/ton of paper by 31.3.05 <1.0kg/ton of paper by 31.3.08	Present value 0.63 to 0.70 kg/ton of paper
Lime Kiln	Installation before 31.3.07	Lime kiln in operation from 1st Jan05 onwards Production : 57-60 TPD Purity : 78-80%
Effluent volume	<140 m³/ton of paper by 31.3.05 <120 m³/ton of paper by 31.3.07	Present value-110 m³/ton of paper
NCG control	-Installation before 31.3.07 - Incineration in lime kiln	Blow heat recovery Upgradation will be completed by March 07. Study for NCG handling will be done by June 07 (ENMAS-ANDRITZ)
Irrigation	Utilization of treated effluent for irrigation	- Existing park & garden in the mills & colony are being irrigated with the treated effluent. - Paddy crop developed with treated effluent near ETP & A-1 bungalow. - One acre land is being developed with treated effluent for sugar cane crop in the mill premises.

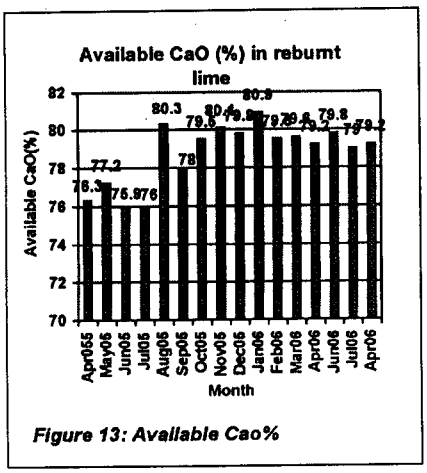

Figure 13: Available Cao%

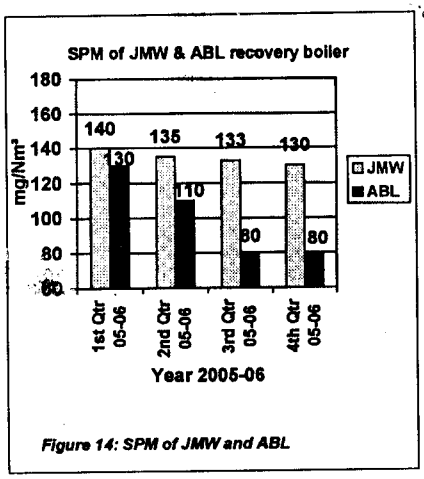

Figure 14: SPM of JMW and ABL

year are given in the Fig 14.

CONCLUSION

The investment made in environment protection may not pay tangibly but benefits derived out of such investment can be relised in terms of fulfillment of social obligation, which is more important for survival of any industry. In the context CREP have a lasting positive impact on protection of environment.

FUTURE ACTIONS

- To install new disc filter for the reduction of water consumption < 120 m³/t of paper
- To install Producer gas plant as a fuel for lime kiln in place of depleting furnace oil as nature resource.
- Upgradation of blow heat recovery system for incineration of Non condensable gases (NCG).
- Incineration of NCG (Mercaptans) emitting from Blow Heat Recovery (BHR) areas of pulping and soda recovery evaporators.

BIBLIOGRAPHY

1. N.Sarma, S.N. Nath and N.D Rajkhowa "Environmental Safe-guard Through Implementation of CREP", IPPTA Convention Issue, 2004, 33
2. Akira Yoshitake, Motoki Sakashita, "A new suction-roll shell material for highly aggressive paper mill white water environment", Vol.76, No.1 Tappi J, 91
3. Gitanjali Chaturvedi, R.K Jain, K.Singh and A.G. Kulkarni "Indian Paper Industry-Grpwth and Prospects", IPPTA J. Vol. 18, No. 2, Apr-Jan, 2006,76
4. Reid Miner, Jay Ubwin, "Progress in reducing water use and wastewater loads in the U.S. paper Industry" August1991, Tappi Journal, 127
5. Nikhilewar Sharma and H.Charkravarty "Towards Cleaner Production: Nagaon Paper Mill"

   IPPTA Conversion issue, 2006,123
6. K.S. Rajesh, M.C. Faizur Rahman "Scientific Approach of Water Management and Conservation", IPPTA Convention Issue, 2004, 51
7. N.Sarma and N.D. Rajkhowa "Pulp and Paper mill wastewater characteristics and its Impact on the quality of ground water in the neighboring region", IPPTA Convention Issue, 2004, 85