

## ENVIRONMENT PROTECTION IN PULP INDUSTRY

- Jain, Shailendra\*

---

### ABSTRACT

*Pulp Industry which provides the basic necessities of Paper and Textile fibre for the nation has become synonymous with degradation of environment through pollution and deforestation. This need not be so, and the Pulp Industry can continue to provide these basic necessities without ill-effects through an environment protection programme suitably balanced between reduction of influent load and treatment of effluents. This approach followed at Harihar Polyfibers, a Rayon Grade Pulp Industry in Karnataka, not only made environment protection effective but also resulted in saving of considerable resources.*

*However, it may not be possible for the industries to put such programme into effect from internal resources alone. Since greater part of the advantages stemming from environment protection flows to the nation as a whole, it is only appropriate that the role of the Government should not only be enforcement but it should also provide adequate encouragement in the form of fiscal incentives and practical policies.*

---

It is seldom realised what is being lost to the environment is a loss of profits to the industry and of natural resources to the country with overall ill-effects. Even the untreated sewage which is indiscri-

---

\* Executive President of GRASIM INDUSTRIES LIMITED

minately drained by the Local Bodies into the rivers, polluting them, is a direct loss of valuable energy and fertilizer that could be extracted from them and also indirect losses by way of spread of diseases. No sooner this realisation is brought home, than the entire outlook towards pollution abatement should undergo a change. It may no more be taken as a compulsion, but a source of direct and indirect benefits to all including the industry and the Government.

#### CONTROL OF POLLUTION FROM MANUFACTURING OPERATIONS:

If an effluent treatment scheme is designed with full emphasis on recovery of chemicals and energy through in-plant recycling, then it not only adds to the revenue of the industry but also makes effluent treatment easy and effective. However, for this approach no ready made solutions are available for straight forward adoption as each industrial operation has a peculiarity of its own. What is needed is a keen observation of how, why and how much of the raw materials and chemicals are being lost in each process operation and then to work out innovative methods and technologies for reducing the same. Needless to say, a great deal of motivation of the operating personnel is necessary as the loss of resources in effluent was hardly ever associated with wastage. This is best achieved by informing those concerned of the value of resources going in the effluent in each process operation and then to motivate them to find ways and means of reducing the same.

In a key note speech on Energy Saving and Environment protection delivered at the SPCI Meeting in Stockholm in April 1984, examples of new technologies were given where environmental protection and energy saving had gone hand in hand. The Swedish Pulp and Paper Association observed that while looking into the new processes to decrease the impact on environment, it was striking to find that most of them were based on the principle of resource saving.

A three-tier approach aimed at Environmental protection based on the above thoughts is described below:

- I. Maximum recycling of chemicals and wastes within the process to reduce influent pollution load.
- II. Effective effluent treatment facilities.

III. Research and development directed towards recovery of Biogas from the effluent treatment operation.

The implementation of these steps at Harihar polyfibers is elaborated hereunder:

I. Maximum recycling of chemicals and wastes within the process to reduce influent pollution load.

A few inplant measures implemented for the conservation of water, chemicals and cellulosic fibre are mentioned below:

a) Recirculation of back water

With a view to minimise the water consumption, the water used in several stages which was earlier being discharged, is recirculated for suitable operations. Thus, the unbleached thickner back water, the bleach thickner back water and the back water from individual bleaching stages is being reused for diluting the pulp in the respective previous stage.

b) Dust removal from wood chips

Carryover of chipping dust with wood chips not only consumes chemicals and spoils pulp quality but also causes higher load on the effluent treatment plant. Dust screens have been provided at the existing chip-screens, and the dust so separated is being collected and used as fuel.

c) Recycling of Biffer rejects from effluent drain

These rejects which contain substantial quantities of cellulose are being separated by biffer screens and recycled in the pulping process.

d) Separation of Centricleaner rejects

The pulp rejects from 4th stage centricleaner are being separated by a sharp screen and being used by the nearby small scale cardboard industries.

e) Recovery of sodium salt from Recovery Boiler flue gases

Electrostatic Precipitators have been modified to improve the efficiency to recover the sodium salts from the flue gases.

f) Recovery of Lime Dust from Lime Kiln Exhausts

Ventury scrubbers have been installed to collect the lime dust particles going in the exhaust and same is being recovered.

g) Recovery of Alkali from Green Liquor Dregs

A Supercentrifuge is installed to separate out the solids and recycle the alkali.

h) Complete recycling of lime sludge

The lime sludge generated during causticizing is fully recycled through a rotary kiln.

i) Good House Keeping

A good house keeping is ensured at all stages to avoid spillages, overflows and wastages of chemicals. Storage pits and circulation pumps have been installed at several places in the digester house to avoid the losses.

The above steps have progressively reduced the chemical consumption to a great extent.

The % reduction achieved in chemical consumption per ton of pulp in 1986 compared to 1982 is given below:

	<u>% Reduction</u>
Caustic soda	53.9
Salt cake	34.0
Chlorine	35.6
SO <sub>2</sub>	24.6
Lime Shell	30.6

## II. Effective Effluent Treatment Facilities

For the effluent treatment, proper segregation of effluents, conventional treatments such as clarification, treatment in anaerobic and aerobic lagoons is done followed by implementation of modern technology of Extended Aeration Activated Sludge Process at a cost of Rs. 235 lacs. This has brought down effluent to within stipulated standards, for discharge into inland surface waters. In the bargain,

substantial saving of valuable resources has been made. This achievement could be seen from the following values of influent and effluent characteristics before and after the implementation of the first two phases of the environmental protection programme.

	TO TREATMENT				AFTER TREATMENT			
	1982-83	1983-84	1984-85	1985-86	1982-83	1983-84	1984-85	1985-86
BOD ppm	868	409	273	210	363	214	23	23
COD ppm	3001	1803	987	802	1254	1168	419	379
TSS ppm	807	487	501	272	404	306	80	83
Effluent/T of pulp,Cu.M.		-	-	-	200	180	176	165

(Annual Average of daily results - ppm)

Thus it is possible to control the pollution within practical limits through an appropriately designed programme and the industry stands to gain at the end of the day.

### III. Research & Development directed towards removal of the colour from Pulp mill effluent and Recovery of Biogas from the high BOD Effluents

- A. From the data mentioned giving the characteristics of untreated and treated effluents it is seen that it has been possible to meet all the parameters of river discharge standards for pulp mill effluent except for COD, in respect of which a workshop on COD reduction and colour removal from pulp and paper mills' effluent was conducted by Karnataka State Pollution Control Board on 23.11.1985. This meeting concluded that though this colour is non-toxic and harmless, yet, further research should be carried out to work out techno-economically viable ways and means of eliminating colour owing to the anaesthetic appearance.

The investigation work done in the laboratory attached to this industry regarding the colour removal problems are (a) treatment with calcium hypo chlorite, (b) massive lime, (c) alum in conjunction with other chemicals such as sodium aluminate, a few polyelectrolytes, ferric chloride, ferric sulphate and chitosan. Further work in this direction is underway.

B. Prehydrolysate liquor obtained in the pulping process is having highest BOD, COD and wood sugars and lowest volume. Hence this stream has the potential for use as Bio-mass.

Investigations were carried out for exploring the possibilities for utilising the pH liquor effluent and the current status is given alongside.

i) Production of Furfural

Isolation of furfural from the pH Liquor which is rich in pentosans is attempted by acid hydrolysis and fractional distillation. The yield obtained is less and the cost of isolation high.

ii) Destruction in Recovery Boiler

For trial, pH Liquor was mixed with black liquor. The mixed liquor was evaporated and burnt in Recovery Boiler. Heavy scaling on evaporator tubes was noticed.

iii) Generation of Biogas (methane)

Laboratory scale and pilot plant scale studies were conducted to explore the feasibility of biogas generation from the prehydrolysate waste. Methane gas could be obtained with a composition of 60-65 % methane and 35-40 % carbon dioxide. However the residence time required was high. Further investigations for implementation of this process on full scale are underway.

GOVERNMENT ROLE

While the goal of pollution control necessarily motivates the industry to find ways and means of reducing 'In-plant Wastages' and institute 'recycling of chemicals and wastes', thereby reducing the consumption of raw material and chemicals in manufacturing operation, it simultaneously helps the community at large through reduction in ill-effects of pollution. In industrialised nations, it has been found that the economic damage to the following extent is being caused by pollution:

	Per Capita Cost US \$			
	USA	CANADA	UK	ITALY
Health	60.0	2.5	35.00	2.5
Agriculture	0.5	0.5	10.00	0.5
Service/ Tourism	20.0	10.0	10.00	5.0
Materials	24.0	49.0	14.00	5.0
TOTAL	104.5	62.0	69.0	13.0
As % of GNP	2 %	1 %	3 %	1 %

(Source: Mr. K.P.Nyati, Director (Pollution Control), NPC, New Delhi.

This in other words means that pollution control could help the Government in preventing losses to the extent of 1 to 3 % of the GNP and obviously this advantage to the nation is very significant.

In the present scheme of the things, the responsibility of controlling pollution is more or less entirely thrust on the industries, while greater part of the benefits stemming therefrom are flowing to the entire nation. Taking a practical view, it is difficult for industries to invest in a comprehensive and well designed environment protection programme due to paucity of resources. The motivation is further reduced as the industry cannot achieve direct economic rate of return on such investments. Therefore, it tends to take only half hearted measures resulting in continuity of conflicts with enforcement agencies. Appreciating this difficulty, and the community at large being the bigger of the beneficiaries, the Government in the larger interests should come forward to help the industries setting up well designed comprehensive pollution control system.

The fiscal incentives being presently offered by the Government for pollution control are given below:

#### RELATING TO INVESTMENT

1. 30 % depreciation allowance on Notified items.
2. 35 % investment allowance against general rate of 25 %.

#### RELATING TO RECURRING EXPENDITURE

1. Rebate on water cess.

To what extent these incentives are helping the cause of pollution control in respect of pulp industry is examined below and

and certain suggestions given.

### RELATING TO INVESTMENT

The aggregate present worth of the aforementioned two incentives work out to only 11.8 % of the investment in case of profit making industries. But the industries running into a loss cannot immediately get the benefit of these incentives. Thus even in their limited extent, these incentives are not uniformly available to all industries and their very purpose is defeated.

It is suggested that:

(i) the incentive should be in the form of cash subsidy so that it is available to all industries investing in environment protection programme and its quantum should be a minimum 25 % of the investment. In this context it is noteworthy that the present worth of incentives offered in most industrialised countries exceeds this figure.

(ii) the Government should also consider exempting the burden of excise duty, central and state sales tax on the indigeneous pollution control equipments and customs duty on the imported ones. This, in no way, is going to affect the present revenue to the Exchequer, being an additional area of development.

(iii) all construction material like cement or steel etc. should be exempted from Central and State taxes and duties and should be provided under Levy Quota.

### RELATING TO RECURRING EXPENDITURE

The only incentive available in this respect is rebate on the water cess. Besides being a meagre benefit it is only an incentive in letter and not in spirit. Inability of an industry to meet the standard of even one of the several parameters debars it from getting the rebate. In case of pulp industry, it has been acknowledged that there is no satisfactory way of removing colour but even then rebate is not given inspite of meeting all other parameters.



It is suggested that:

(i) the condition of successful operation of treatment plant to qualify for this rebate should be interpreted as substantial reduction in the pollution load. Alternately, the standard should be revised if not feasible.

(ii) All the Process material inputs should be exempted from Central and State taxes and duties.

Private Sector industries should be represented on Central and State Pollution Control Boards to provide them a sense of involvement in the Environment Protection Programme.

In Pulp Industry, part of the advantages of pollution control can accrue to the industry if it judiciously balances between inplant recycling and treatment of effluents. However, greater part flows to the Government in as much as its direct expenditure for combating ill effects on health, agriculture is saved and natural resources conserved. Therefore, Government and industry should play supplementary and complementary roles in establishing well designed comprehensive environment protection programmes. The role of the Government should be of positive encouragement through suitable fiscal incentives and policies, and not of enforcement alone.