Environmental Management at Hindustan Newsprint Limited

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ABSTRACT:-- Integrated pulp and paper Mills generate pollutants during the manufacturing process in the form of liquid effluents, solid wastes and Air pollutants. In majority of Indian Paper Mills, the pollution load in the liquid effluents are controlled by primary and secondary treatments, the solid wastes are disposed off by land fill and air pollutants are controlled by Electrostatic precipitators.

To keep the Environment free from pollution, Hindustan Newsprint Limited has upgraded/modified the systems to reduce pollution at source by installing new equipments like Twin roll press in chemimechanical pulp mill and recycling the porcess back water. This and the other measures adopted has reduced the water consumption to 140 m^3/MT of newsprint. The solid wastes are recycled in lime kiln, FBC boiler and cement plants. The effluent sludge is dewatered to 40% dryness in Andritz filter to burn in FBC boiler for using as secondary fuel alongwith chipper dust. The stocker fired boilers were converted to FBC boilers to use multi fuel, improve combustion efficiency and utilise the boiler ash generated for manufacturing portland pozzolana cement and construction bricks. Lime kiln was installed to burn the filter sludge from causticizing plant for generation of lime. With reuse and recycling, the solid waste generation is reduced to 1.7 MT/day only. To control the air pollutants Electrostatic precipitators are installed in FBC boiler and lime kiln in addition to the existing ESP in the Recovery boiler. Venturi Scubber was also installed in lime kiln to control air pollution. A green belt is maintained inside the mill and colony area including the solid waste dumping yard by planting different species of trees to keep the environment clean.

INTRODUCTION

Hindustan Newsprint Limited is an integrated pulp and paper mill set up in 1982 with an installed capacity of 80,000 MT of Newsprint per year and subsequently the capacity has been enhanced to 1,00,000 MT per annum in 1993. Environmental Pollution Control measures have been adopted from the design stage itself and forms integral part of the mill. During the commissioning of upgradation and modernisation schemes in 1993 more emphasis was given for pollution control and environmental protection while increasing the capacity to 1,00,000 MT per annum of newsprint. Hindustan Newsprint

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Limited have baged two times the award from Kerala State Pollution Control Board for the best Effluent treatment facilities established in the mill. The paper deals with the various measures adapted by Hindustan Newsprint Limited to make its environmental management exemplary.

POLLUTION SOURCES AT HNL

The pollution sources at Hindustan Newsprint Limited can be broadly classified into 3 catagories as is generaly in any pulp and paper mill.

1. Liquid effluents
2. Solid wastes
3. Air pollutants

To contain the pollution loads at different sections of the plant, modifications were carried out in the process in a phased manner to improve the Environment towards a cleaner environment.

LIQUID EFFLUENTS

Originaly, the effluent treatment plant was designed to segregate the effluents on the basis of suspended solids. The effluents were segregated into high solids sewer which contain effluents with higher suspended solids which are removed in primary treatment in the clarifier and low solid sewer which contain effluents with lower suspended solids and do not need primary treatment. The uncontaminated water was segregated to a separate clear water sewer which does not require any treatment at all.

The high solid effluents after treatment in the primary clarifier for removal of suspended solids are mixed with low solid sewer effluents and are let into stabilisation ponds (2 Nos. in series). The secondary treatment is carried out in the aerated lagoons which contain 16 aerators of 55 KW capacity, out of which 12 Nos. are in primary aeration lagoon and 4 Nos. are in secondary aeration lagoon. Nutrients in the form of DAP and urea are added at the inlet of primary lagoon. The treated effluents are discharged into Muvvattupuzha river through a dispersion unit.

The low solid sewer contain good amount of suspended solids and these solids are carried to the stabilisation ponds as they are not subjected to primary treatment. These suspended solids used to settle in the stabilisation ponds necessitating frequent desludging. The high solid sewer which consists of coloured effluents from pulp mill and paper machine are treated with alum for removal of colour before the primary clarifier. Due to high hydraulic load on the primary clarifier, the settling of coloured flocs in the clarifier are getting affected and partly carried with the clarifier overflow.

For better colour removal and to remove the suspended solids completely during the modification of the mill in 1993 the effluent treatment system was streamlined by segregating the effluents to coloured effluents and fibrous effluents. The coloured effluents consists of effluents from unbleach section of chemical pulp mill, chemimechanical pulp mill and effluents from Recovery plant evaporators section. The fibrous effluents consists of effluents from chemical pulp mill bleach section, paper machine effluents, power boiler effluents and causticizing plant effluents.

MODIFICATIONS IN EFFLUENT TREATMENT PLANT

The main problem in Effluent Treatment Plant was due to high coloured effluents from chemimechanical pulp mill and carry over of suspended solids in low solids sewer. The high coloured effluents require large quantities of alum and the formation of high quantity of coloured flocs adversely affect the efficiency of the primary clarifier. To take care of the above deficiency in the system the following modifications were carried out.

1. To control the generation of coloured effluents, a twin roll press was installed in chemimechanical pulp mill to squeeze out more spent liquor from the unbleached pulp.
2. Installation of additional effluent clarifier of 50m dia for treating the fibrous effluents separately.
3. Installation of Andritz make Twin wire press to dewater the sludge from the two clarifiers.

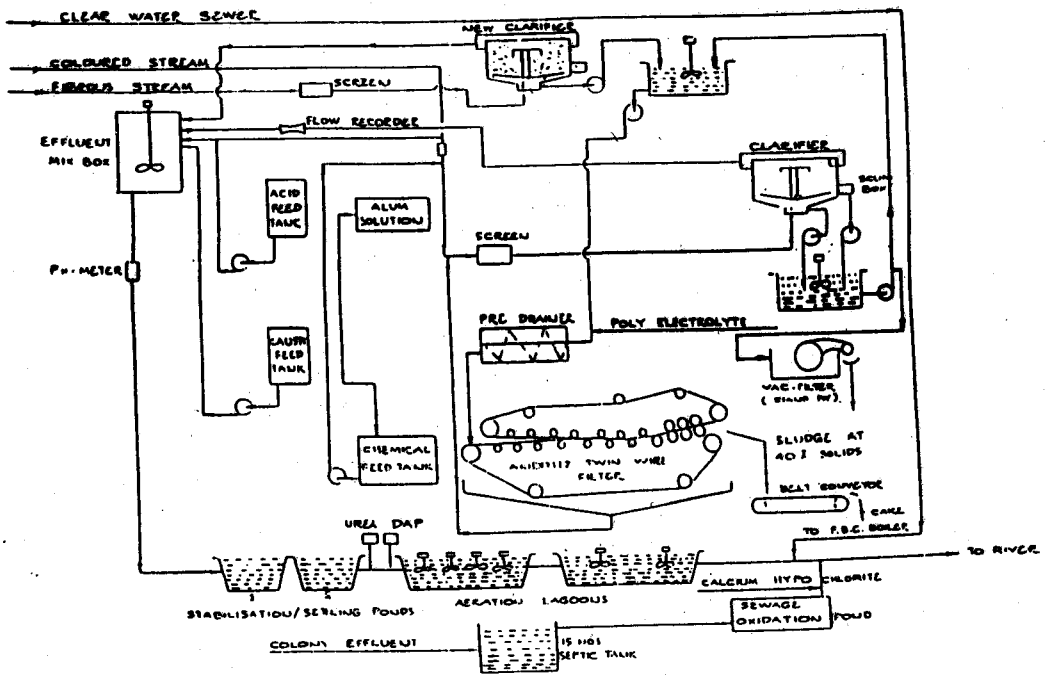

Fig. 1 BLOCK DIAGRAM OF EFFLUENT TREATMENT PLANT

Table-I

Characteristics of coloured effluents, fibrous effluents and treated effluents.

Sl. No.	Particulars	Unit	Coloured Effluents	Fibrous Effluents	Treated Effluents	Tolerance limits as per KSPCB
1.	Flow	M^3/day	7840	26200	34040	45000
2.	pH	--	9.1	6.9	7.3	5.5-9.0
3.	Colour	pt.co. units	6570	300	210	x* + 200
4.	Suspended solids	mg/l	545	514	88	100
5.	COD	mg/l	2616	1120	240	250
6.	BOD_5 at 20°C	mg/l	580	280	28	30

* x is the river water colour.

The modified effluent treatment plant flow sheet is given in Fig.-I. The characteristics of coloured effluents, fibrous efflunts and treated effluents are given in Table-I.

IMPACT OF MODIFICATIONS

The installation of Twin roll press has improved the recovery of chemicals from chemimechanical pulp mill from 35% to 70% and reduced the colour of effluents from 21,500 pt Co units to 14,400 pt Co units showing a reduction in colour by 33.0%. This, in turn, has resulted in the reduction in alum consumption for colour removal of combined coloured effluents from 18 MT to 10.7 MT showing a reduction of 40.6% in alum consumption.

The characteristics of treated effluents as given in Table-II indicate that pollution parameters of effluents are within the tolerance limits laid down by Kerala State Pollution Control Board i.e. pH is 7.3 against a limit of 5.5 - 9.0, colour is 210 pt-Co units against the limit of 40 + 200 pt-Co units (40 is the river water colour in pt-Co units). The suspended

solids are 88 mg/l against a limit of 100 mg/l. The chemical oxygen demand is 240 against a limit of 250 mg/l. The BOD_5 at 20°C is 28 mg/l against the limit of 30 mg/l. The effluent treatment plant efficiency in terms of colour removal is 88%, suspended solids removal is 83%, COD removal is 83.6% and BOD removal is 92%.

The underflow sludge from 30m dia clarifier and 50m dia clarifier are blended in a sludge tank and from there it is dewatered on the Andritz filter to 40% dryness and the sludge is used in the FBC boiler alongwith coal and chips dust.

SOLIDS WASTES

The solid wastes are generated at different production stages as follows:

1. Wood/Reed/Bamboo dust from chipper house.
2. Effluent sludge from effluent treatment plant.
3. Lime sludge from Causticizer plant.
4. Classifier grits from causticizing plant.
5. Hypo sludge from Hypo preparation plant.
6. Coal ash from power boilers

Majority of the above wastes were disposed off by land fill before 1993. To keep the environment free from pollution., HNL has implemented different schemes to reduce the solid wastes during modification of the mill in 1993, The solid wastes generated at different section and their utilisation are given in Table-II.

Table-II

Solid waste generation and utilisation

Sl. No.	Particulars	Generation BDMT/day	Utilisation
1.	Chips dust	9	Fuel in FBC boiler
2.	Effluent sludge	10	Fuel in FBC boiler
3.	Lime sludge	45	Reburning in lime kiln
4.	Classifier grits	1.2	Land fill
5.	Hypo sludge	0.5	Land fill
6.	Fly ash/Bottom ash	160	Making cement and bricks.

CONVERSION OF STOKER FIRED BOILER TO FBC BOILER

The stoker fired boilers were converted to Fluidised bed combustion boiler to facilitate the use of Multifuel i.e. effluent sludge and chips dust along with low quality coal (45% ash) and to improve the combustion efficiency. The 9 BDMT/day chips dust and 10 BDMT/day effluent sludge from Andritz dewatering press are used in FBC boiler. The FBC boilers are generating 130 MT/day fly ash and 30 MT/day bottom ash. The fly ash is being used by M/s. Cochin Cements Limited, Kottayam for making 200 MT/day Portland Pozzolana Cement. The bottom ash is used by Excel Brick Industries to make bricks for construction.

INSTALLATION OF LIME KILN

About 45 BDMT/day lime sludge generated in the causticizing plant is utilised in 50 MT/day capacity rotary lime kiln. The lime sludge along with lime shell as make up is burnt in the kiln to produce lime having a purity of 80-85% for using in the causticizing plant. This has resulted in the elimination of disposal of lime sludge by land fill and also improved to performance of causticizing plant.

No use for 1.2 BDMT/day of classifier grits and 0.5 BDMT/day of hypo sludge is established yet and is disposed off by land fill.

A total quantity of 224 BDMT/day solid waste generated at HNL is effectively recycled and only a very small quantity of 1.7 BDMT of solid waste for which proper use could not be established is disposed off by land fill. Thus delivering the near zero waste concept at HNL.

AIR POLLUTANTS

Dust and other gas emissions are generated from different sections of the mill as follows:

1. Coal handling plant
2. Coal fired boilers
3. Recovery boiler
4. Lime kiln
5. Chemical Pulp Mill

Coal handling plant is having a capacity to stock

Table-III

Characteristics of Ambient Air

Sl. No.	Particulars	Unit	Standard* Max	Near Electrical Substation (East)	Near HNL Hospital (North)	Near Lagoon Gate (West)	Near CISF Barrocks (South)
1.	Suspended particals	$\mu g/m^3$	500	10.9	37.4	108	64.8
2.	Sulphurdioxide	$\mu g/m^3$	120	NIL	20.4	35.6	NIL
3.	Oxides of Nitrogen (NO_x)	$\mu g/m^3$	120	5.8	6.1	13.9	16.3

* Standards prescribed by Central Pollution Control Board for Industrial area.

50,000 MT of coal and crushing capacity of 60 MT/ hr. Dust extraction systems are provided in coal wagon tippler and coal bunkers for extracting dust. All conveyor chutes in coal handling system are provided with water sprays. Water sprinkler system is provided to control the generation of dust at the coal crushing plant. A new "Impactor System" has been installed and is being provided with "Dust Separation System".

The fluidised bed boilers which use about 400 MT of coal let out 1,60,000 m^3/hr flue gases which are treated in the ESP before escaping into the atmosphere at about 70 meters above the ground level through chimney. In Recovery boiler, about 130 MT/day of black liquor solids are fired to recover chemicals and generate steam. From here 56,000 m^3/hr flue gases is let out which is treated in ESP before dispersing into atmosphere through chimney.

In the lime kiln about 50 BDMT/day of lime sludge and lime shell are calcined for producing burnt lime. The kiln generates 7,000 m^3/hr flue gas, This flue gas is passed through a venturi scrubber and ESP to control the dust emissions.

In chemical pulp mill, being a kraft process, variable mixtures of H_2S and mercaptans are produced during pulping and they are let into the atmosphere when the digester is blown after completion of cooking.

AMBIENT AIR QUALITY

The impact of discharge of flue gases into atmosphere is studied by monitoring ambient air quality on the four sides of the mill. The ambient air quality characteristics are given in Table-III. The results indicate that the suspended particulate matter, sulphur dioxide and oxides of Nitrogen are well within the limits prescribed by Central Pollution Control Board for Industrial area. The suspended solids varied between 10.9 $\mu g/m^3$ to 108 $\mu g/m^3$ against the limit of 500 $\mu g/m^3$. The sulphur dioxide varied between Nil to 35.6 $\mu g/m^3$ against the standard of 120 $\mu g/m^3$. The No_x varied between 5.8 $\mu g/m^3$ to 16.3 $\mu g/m^3$ against the standard 120 $\mu g/m^3$.

These results clearly indicate that the atmospheric pollution due to the various emmission from the mill is very minimum.

GREEN BELT COVER

Plantation of different species of trees had been taken up since 1987 and more than 90,000 trees were planted around the filled up area of the waste dumping yard and along the lagoons and the colony area. This has created good greenary in the sorrounding in addition to decreasing the effect due to atmospheric emissions.

CONCLUSION

Due to its concern for clean environment Hindustan Newsprint Limited with its basic design and various modification schemes implemented, has achieved source control of pollution, improved effluent treatment plant efficiency, moved towards almost zero solid waste generation by recycling

different solid wastes and with a green belt cover maintained the mill surroundings free from air pollution making its environment management exemplary.

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