



## ITC LIMITED

### Flash Steam Recovery from Boiler Blow Down and Steam Air Heater Condensate

#### SUMMARY OF THE OPTION

M/s ITC Limited–Paperboards and Specialty Paper Division (ITC–PSPD), Bhadrachalam unit commenced its commercial production in October 1979. It is the largest and one of the best performing integrated pulp and paper plants in India with a design manufacturing capacity of 200,000 tons per annum (TPA) of paper and paper boards and was actually producing around 238,000 – 240,000 TPA. Notwithstanding, the unit, plans for an immediate expansion with the addition of another Paper Machine, thus taking the manufacturing capacity upto 2,85,000 TPA. The products range from Printing and writing paper of various grades, Poster paper, Uncoated paper board and Coated paper board. The annual electricity consumption is of the order of 242 Million kWh and the thermal energy consumption totals 914913 Million kCals/annum. The energy cost accounts for 5.12% of the manufacturing cost. The specific electricity consumption is 971 kWh/Ton and the specific thermal energy average is 3.87 Million kCal/Ton.

The increase in the DM feed water temperature by about 6°C reduces LP steam that was used for heating in the deareator by 19.5 TPD worth Rs.19.5 lakhs (US\$ 45,349) at a total investment of Rs. 17.3 lakhs (US\$ 40,233) (including cost of equipment, mechanical instrumentation and civil works, erection and commissioning charges as well as consultancy charges which would be paid back in less than 11 months.

#### KEY WORDS

India, Pulp and Paper, Boilers and thermic fluid heaters, Flash steam, Blow down

#### OBSERVATIONS

The high-pressure blow down from the existing fluidized bed boiler Nos. 2, 3, 5 and Soda Recovery Boiler No. 3 is discharged into the drain without any recovery of heat or flash steam. Similarly, the condensate from the steam air heater (an equipment where steam is used to preheat the air before it enters the burner of a boiler) is also discharged without any heat/flash steam recovery. This wasted heat is recovered as flash steam and is used in place of the low pressure steam from the main line by two separate shell and tube type of heat exchangers using De Mineralized (DM) water in the tube side. This dematerialized water is now fed to the deareator (a deaerator is an equipment before the boiler feed water pump and is used to remove dissolved gases from water by heating the water, before it enters the boiler). The quantified observations are as follows:

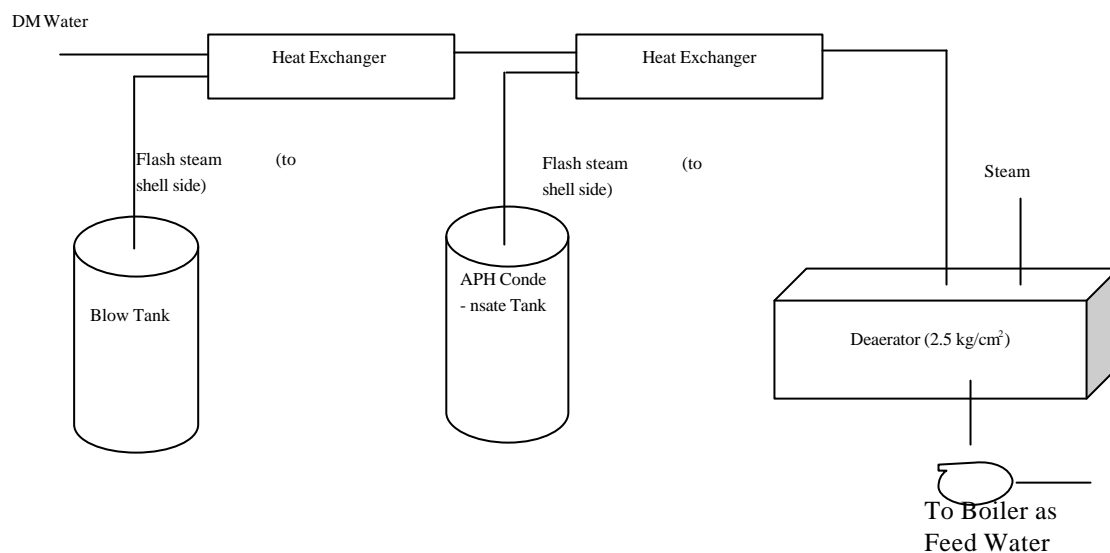
- DM water temperature fed to the deareator: 60°C
- LP Steam is used for heating deareator for dissolved oxygen removal
- Quantity of DM water being fed to the deareator of SRB #3: 93.5 TPH
- Continuous blow down from boilers, # 2,3,5 and SRB # 3: 7.6 TPD
- Oxygen in feed water in boiler: 5 – 7 TPD
- Flash steam being wasted: 1.55 TPH



## OPTIONS

The following options were identified:

- To recover flash steam generated in the flash tank (of SRB # 3 blow down and steam air heater condensate) for heating of DM water to the deareator, in shell and tube type condensers, towards affecting LP steam reduction in SRB # 3 deareator.
- This involved installation of two shell and tube condensers to condense flash steam released from the blow down tank and condensate tank. The DM water to SRB 3 deareator was rerouted through these condensers to recover heat from the flash steam before being delivered to the deareator of SRB 3.



## RESULTS

**The rationale measures are as follows:**

- Measured reduction in LP steam consumption to deareator: 19.5 TPD (0.8125 TPH X 24 Hrs/day)
- Cost of Steam (From Black Liquor fired):Rs. 300/Ton (US\$ 7)
- Avg. Evaporation Ratio of a Fluidized Bed Boilers in operation: 5.2
- Eqvt. Coal Consumption avoided by way of reduced steam Consumption (*Steam being drawn from a common header*): 3.75 TPD (0.156 TPH)

### Financial benefits

- Investment: US\$ 35,000
- Operating cost: none, as part of regular maintenance cost
- Annual cost savings: US\$ 45349 or Rs.1,950,000 (= Rs.300/Ton of Steam X 6500 TPY @ Rs.43/ US\$)
- Payback period: 9 months

### Environmental benefits

- Annual GHG emission reduction: 1909 tons of CO<sub>2</sub> (= 0.156TPH X 1000 X 8000 hr/yr X 1.53 kg CO<sub>2</sub>/kg Coal) [1]
- Annual Steam Savings: 6500 TPY (19.5 TPD / 24 X 8000 hrs)

[1] – Sourced from UNEP GHG Calculator – General value



**Other benefits**

- Reduction in noise levels due to flashing of boiler blow down and condensate steam to the atmosphere
- Reduced operation of the Coal Handling Plant (marginally)

**FOR MORE INFORMATION**

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***GERIAP National Focal Point in India***

Mr. A. K. Asthana,  
Group Head Energy Management  
Mr. P. K. Gupta, Director, NCPC-India  
National Productivity Council,  
5-6, Institutional Area, Lodi Road, New Delhi - 110003  
Tel: +0091 – 11 – 24697446  
Fax: +0091 – 11 - 24698138  
E-mail: [ak.asthana@npcindia.org](mailto:ak.asthana@npcindia.org), [ncpc@del2.vsnl.net.in](mailto:ncpc@del2.vsnl.net.in)

***GERIAP Company in India***

Mr. Ashish De  
Company Vice President, ITC Paper Boards and Specialty Division  
Bhadrachalam, Andhra Pradesh, India

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