

Environmental improvement as a result of BAT Implementation in Pulp / Paper Industry

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Abstract:

One of fundamental principles of MONDI BP policy is a sustainable development. Within this frame the company has implemented in the last three years a challenging project IMPULS oriented not only for capacity and quality increase of pulp and paper production but mainly aimed at the environmental performance improvement. Through the implementation of BAT technologies (1) such as ozone bleaching the AOX in the effluent has been reduced by 58 % and COD level by 69 %. Significant improvement in SO₂ emissions (level reduced by 92 %) and TRS emissions (level reduced by 96 %) has been reached due to the installation of a new recovery boiler.

The open communication regarding the environmental matters with the public by means of Environmental Days, meetings with inhabitants, publication of analytical data in a local newspaper, etc. improves the image of the company in the public eyes.

Keywords: air pollution, ECF bleaching, ozone bleaching, effluent, emission control, odor, total reduced sulphur.

Main text:

An important tool in the effort to comply with the prescribed limits of parameters decisive from the environment quality point of view is a stepwise upgrading of technology.

Any rebuild, refurbishment, reconditioning or revamping is usually done not only for increasing of production capacity, final product quality improvement or efficiency enhancing but also for the better accomplishment of limits for environmental load.

Valuable method how to compare and than to improve performance of companies is represented by benchmarking. Target is mainly to diminish the gap between mills in question and the best industrial practice.

MONDI BP SCP a.s. in Ruzomberok, Slovakia has already a long tradition in pulp and paper making. The mill history started sometimes about year 1697 with hand made paper. Later sulfite and sulphate pulp mills were established. Over the years the mill has been developed to the one of the most modern and efficient integrated pulp and paper mill in Europe.

MONDI BP SCP a.s. has three paper machines with the overall capacity of 170 000 t offset paper and 320 000 t copy paper. Paper production is supported by the production of cca 410 000 ADMT of sulphate pulp.

The environment was always the issue of the mill due to its location. The mill is located in the valley on the eastern part of the town of Ruzomberok. In its vicinity there are located some villages. Fresh water intake is from river Vah where treated effluent is also discharged. The smell released from pulp production, quality of discharged effluent, and compliance with emission limits were always the matters to be improved.

The main milestones in environmental performance improvement occurred in 1981 when two small sulphite pulp mills and one sulphate pulp mill were replaced by the new sulphate pulp mill and waste water treatment plant was established. In 1983 the waste water treatment was upgraded with the biological stage.

In the early nineties mill switched its steam and electricity production based on coal and heavy oil to natural gas. The waste water treatment plant was upgraded with biological stage and biofilter was installed.

The other important step followed with the implementation of ECF bleaching technology. The elementary chlorine was replaced by oxygen delignification and chlorine dioxide sequences. This change resulted in improving of ambient air quality and removal of one of the most hazardous and toxic substance from the process.

In spite of various partial improvements some unsolved problems remained such as smelly substances (2, 3, 4) from unbleached washing, dispatch of particulates from lime kiln, etc.

The most complex mill rebuild started with IMPULS project launched in 2002. The aim of project IMPULS was not only to increase pulp mill capacity from 270 up to 375 thousand tones and PM 18 capacity from 160 up to 290 thousand tones but also significantly improve the environment conditions, i.e. to comply with BAT limits. Capital expenditures reached 240 mil. EURO.

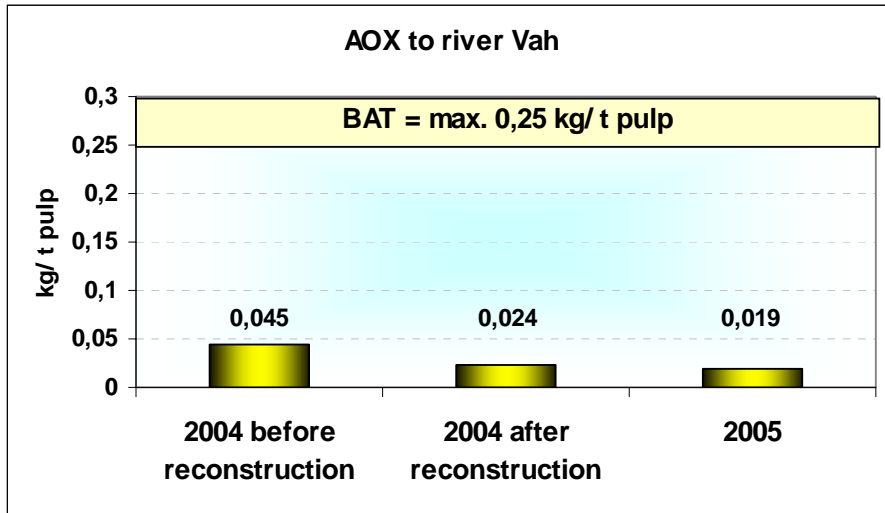
Within the said project the following process changes were implemented:

- 1/ ozone bleaching process in pulp making
- 2/ new recovery boiler was installed
- 3/ NCG system was rebuild and connected to the new recovery boiler
- 4/ Lime kiln was equipped with new electrostatic precipitator
- 5/ PM 18 was refurbished with a single shoe nip press
- 6/ waste water from paper mill was connected to biological waste water treatment plant

Implementation of ozone bleaching technology resulted in substantial reduction of chemical oxygen demand (COD) and adsorbable organic halogens (AOX) (5) in waste water discharged to river Vah. AOx and COD

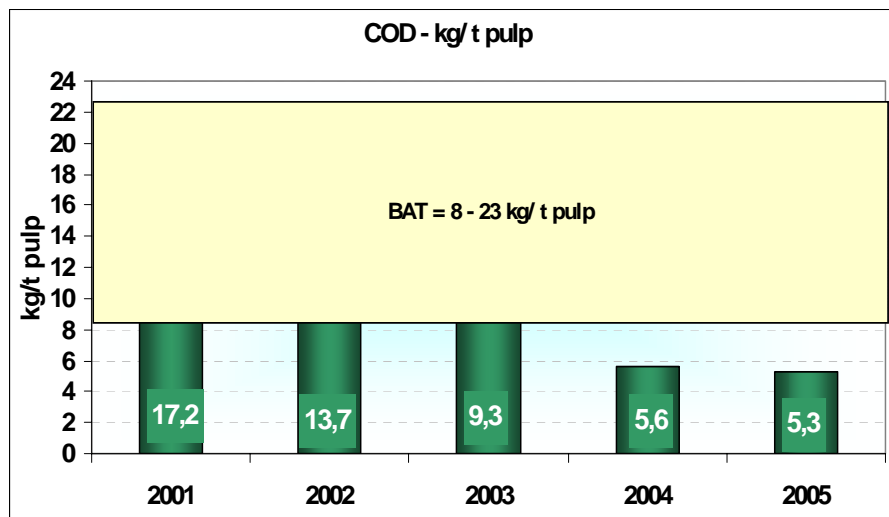
tendency can be seen on Figures 1 and 2 as compared with best available technologies BAT (1) area .

Figure 1: Specific AOX load discharged to river Vah.



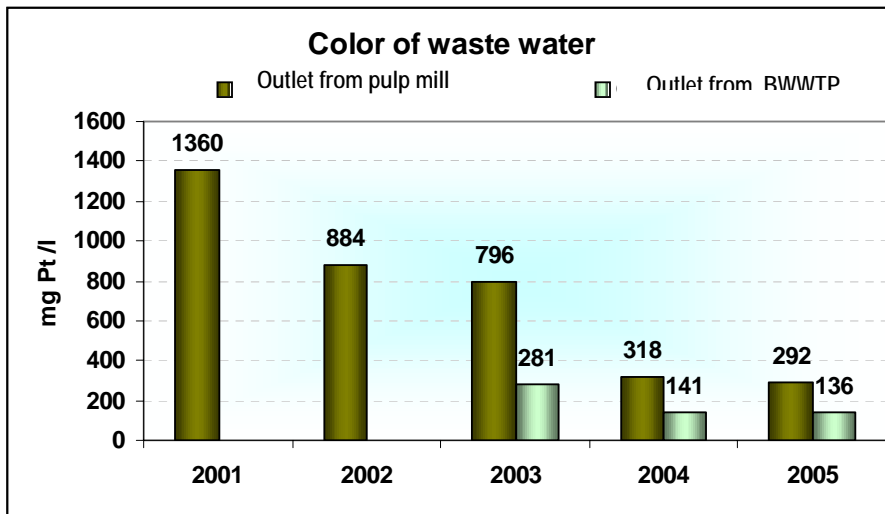
Remark:: AOX was not systematically measured before year 2004 (6).

Figure 2: Specific COD load discharged to river Vah.



It also contributed significantly to color reduction of waste water discharged to river Vah (see Figure 3).

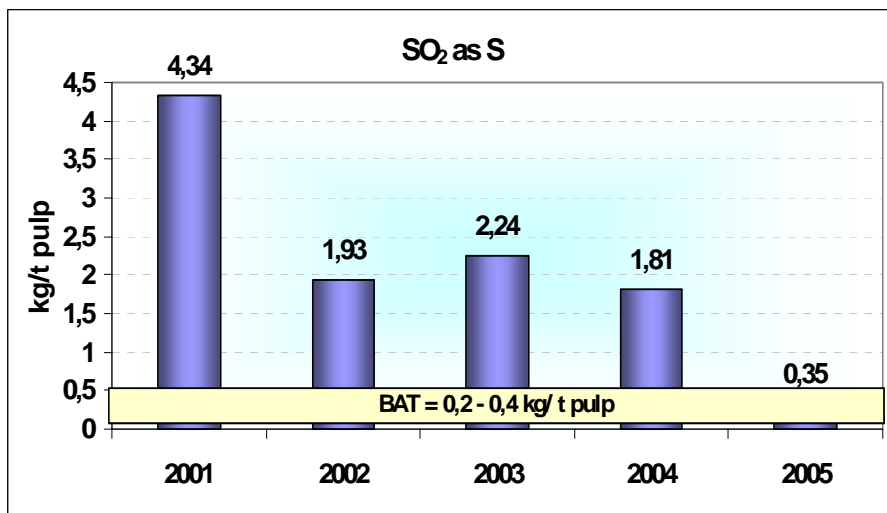
Figure 3: Color diminishing in treated effluent.



The long term biology monitoring in river Vah is confirming the water quality improvement. The river that was in eighties actually „dead“ is now again „alive“. Fishermen indicate revitalizing of fish species sensitive to the clearness of water (e.g. sprout).

Installation of new recovery boiler with high efficiency for sulphur removal and returning back to the process resulted in tremendous reduction of sulphur dioxide (SO₂) and total reduced sulphur (TRS) as can be seen in Figures 4 and 5.

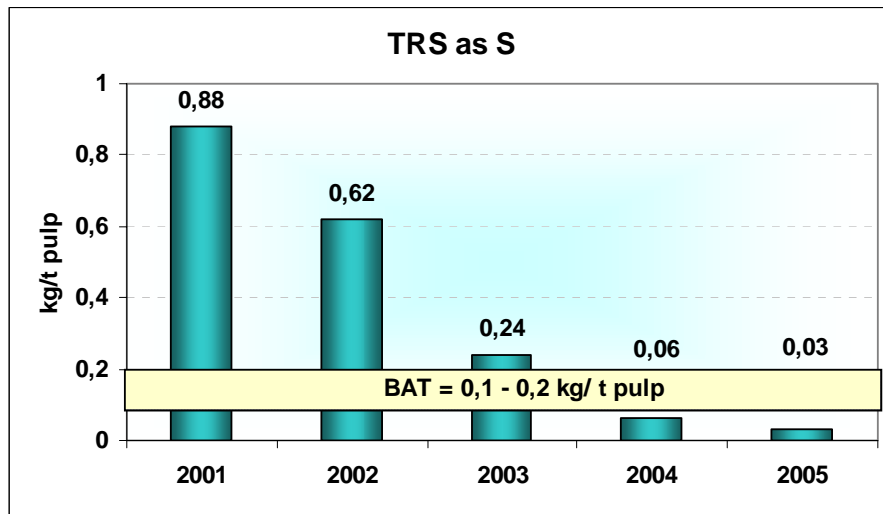
Figure 4: Annual averages of specific amount of SO₂.



Remark:: *The DNCG were connected to burning system and the second recovery boiler was not in operation yet.

The rebuild of the whole NCG burning system and connection of the DNCG to the burning system contributed to the minimalization of TRS emissions (1, 4 7), discharges to the air, and smell reduction in the area adjacent to the mill.

Figure 5: Annual averages of TRS.



Installation of the more efficient electrostatic precipitator on the lime kiln resulted in 97 % reduction of emitted particulates (from 4,71 t/month to 0,15 t/month).

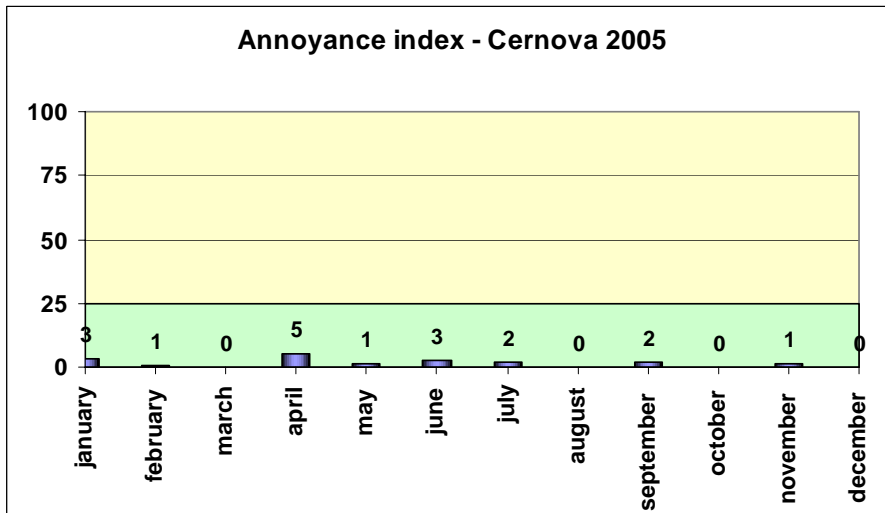
The unique TRS ambient air monitoring system was established in 1997. System currently consists of four stable and one moveable monitoring station enabling to monitor TRS emissions in the town of Ruzomberok and the adjacent surrounding villages.

The measured results are on-line connected to the mill's operator room in order to enable him to take corrective actions in the case of TRS level increase.

The public is involved in smell monitoring in the mill surroundings. Utilizing standard method for annoyance index evaluation (8, 9) gives the complete picture about the smell development and how the public perceive it.

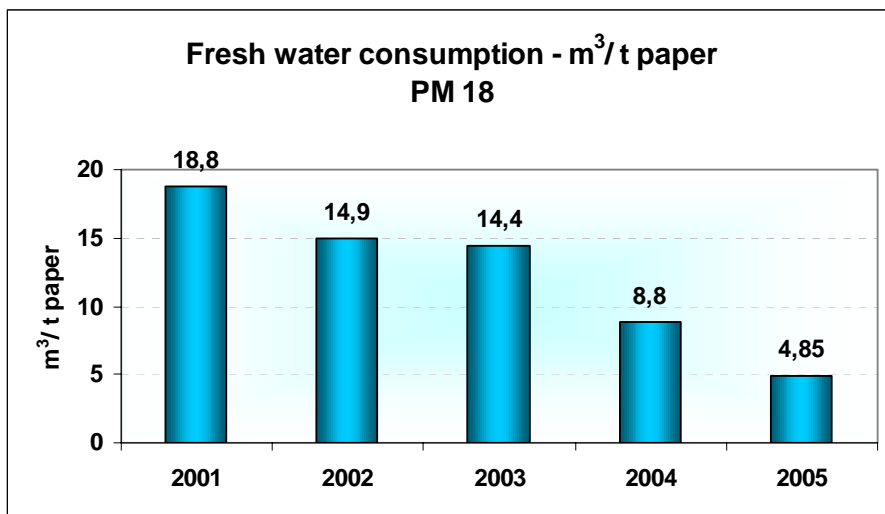
Results of annoyance index achieved in one of stable monitoring stations located in the village of Cernova are displayed on Figure 6.

Figure 6: Annoyance index at Cernova during year 2005.



The PM 18 rebuild contributed not only to the improved energy efficiency and paper quality, but the fresh water consumption was significantly reduced, Results of anually averages of specific fresh water consumption of PM 18 are presented on Figure 7.

Figure 7: Specific fresh water consumption on PM 18.



Conclusions:

The important condition regarding the environment is open communication with the public and authorities. MONDI BP SCP organizes twice a year the Environmental Days. Each Day is dedicated to the different environmental topics (air emissions, waste water, solid waste, noise, etc.) Presentations relevant to the topic are conveyed not only by the speakers from the mill but also by the members of authorities, research institutes, and universities.

Open Days are organized for the public to show the mill performance. Close cooperation with the villages regarding the environment contributes to the mutual trust enhancing as well.

The smell is not an issue anymore in the town and its surroundings. River Váh water quality has improved significantly down stream the mill which is confirmed by macrozoobenthos and microzoobenthos regular monitoring.

Environmental improvement has led to improved quality of residents life, increasing of tourism potential and attractiveness of the mill in question as an employer.

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