(b) Use of catalytic disinfection to remove germs and biofilms

Examples: a) RCF DE 6, b) Papierfabrik Vreden GmbH, c) RCF DE 7, d) Hakle-Kimberly Deutschland GmbH [German comments D 1].

Description: Using a solid metal catalyst and a hydrogen peroxide solution as an 'activator', microorganisms are killed by oxidation. Due to the positive charge of the catalyst the negatively charged microorganisms are drawn towards the catalyst, which will take electrons away from the microorganisms and thus partially destroy them. The remaining fragments and their biotenside properties will lead to a detachment of biofilms present in the water system. The biofilms in turn are then attracted by the catalyst and destroyed.

Achieved environmental benefits:

- no formation of hydrogen sulphide or odour, organic acids or other toxic products,
- no microbiologically induced corrosion,
- no undesirable side effects for humans, the environment or materials,
- H_2O_2 is considerably less dangerous than other biocides.

Operational data:

Catalytic disinfection is permanently used in paper mills (examples a) to c), see Table 2.22) with a paper output between 10 and 100 kt/yr and closed water loops (water volume: 700 – 1 000 m^3, COD: 25 – 40 g/l, fresh water: 1 – 2 m^3/t product). The consumption of aqueous 30% H_2O_2 solution in the first six months is 140 litres per week. The removed biolayer has to be separated. After the first six months the consumption of the solution is only 20 – 30 litres per week. The solution has to be dosed near the catalyst surface. Other biocides or other biocide methods are not necessary. In one case it was possible to halve the consumption of flocculants.

Table 2.22: Example of mills using catalytic disinfection

Plant	RCF DE 6	Papierfabrik Vreden	RCF DE 7
Paper quality	cardboard	paper for corrugating medium	paper for corrugated board
Paper output in t/yr	12 500	75 000	60 000
Water volume in m^3	700	1 000	-
COD in mg/l	25 000	40 000	25 000
Fresh water consumption in m^3/h	3-4	12.5	-
Waste water	0	0	0
H_2O_2 solution (30%), first 6 months	140 l/week	140 l/week	140 l/week
H_2O_2 solution (30%) after first 6 months	28 l / week	21 l/week	-

Catalytic disinfection is intermittently used in paper mills (example d)) with a paper output of 30 to 40 kt/yr and open water loops (water volume: 500 m^3, COD: 2 g/l, fresh water: 12 m^3/t product and waste water: 10 m^3/t product). During the usage of catalytic disinfection the paper production is interrupted for several days, the water volume is reduced by 250 m^3 and the water loop is closed. Several times a day the hydrogen peroxide solution (100 – 1 000 kg per dosage) is dosed near the catalyst. After the treatment the catalyst is removed from the water system and the water is changed. It is possible to use other biocides or other biocide methods during this temporary catalytic treatment.