



University of
Applied Sciences
Giessen-Friedberg

Submerged Plate Membrane Module For Surface Water Treatment



Röhricht, Markus, FH Gießen-Friedberg, Wiesenstr. 14, D-35390 Gießen
Kramm, Dominik, FH Gießen-Friedberg, Wiesenstr. 14, D-35390 Gießen
Weise, Ulrich, Weise Water Systems, Steinbruchstr. 6b, D-35428 Langgöns

INTRODUCTION

In the treatment, in which surface water is transformed into drinking water or industrial water, membrane separation processes, like ultrafiltration, play an increasingly important role. A major problem in membrane processes is the fouling of the membrane. In our work the use of low transmembrane pressures (between -0,2 and -0,4 bar) combined with an air flush was used to minimize fouling.

Another idea was to use a robust module which does not need pre-filtration and can be manufactured at low cost. The solution is a submerged plate module, which is cleaned by means of air bubbles (air flush).

Experimental Set Up

The module was tested in a pilot plant using pre filtered water from the river Main at the site of Infraseriv Höchst and water from the river Rhein at the site of water works Wiesbaden. Two different ultrafiltration membranes, each consisting of PAN, with a molecular weight cut off of 50.000 and 150.000 Dalton respectively were used.

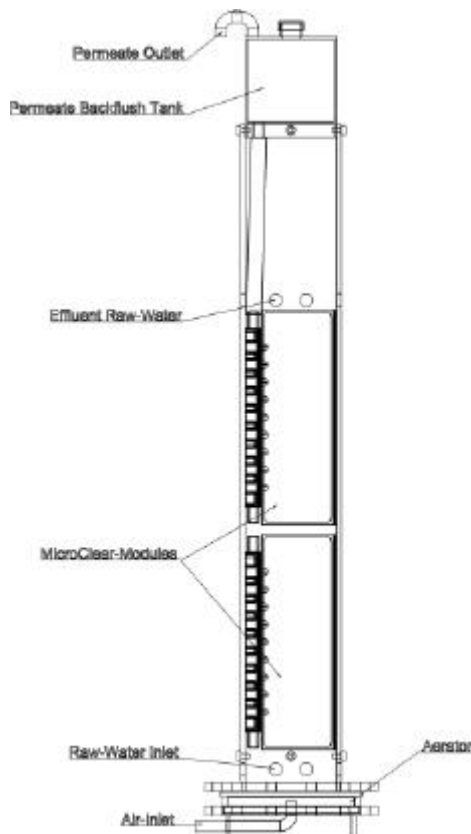


Figure 1: Ultrafiltration plant with two membrane elements and aerator

The following procedures were used to prevent fouling

- air flush 10 m³/h, continuously and in intervals
- permeate back flush at about 0,05 bar, every 30 min.
- gravity flow (only experiment river Main)
- disinfection by H₂O₂ (3 %) about 2 times per week

RESULTS

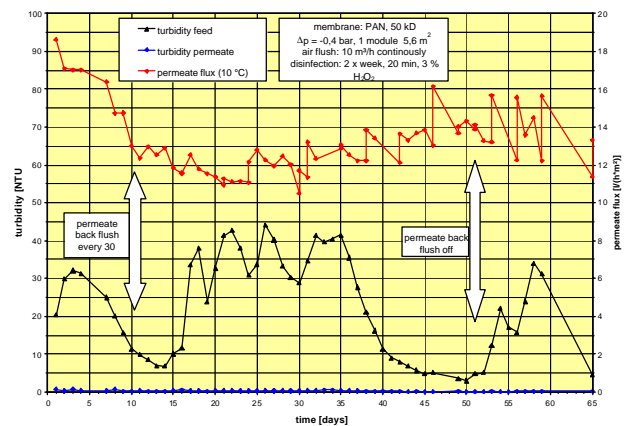


Figure 2: Flux and turbidity over time for the experiment at the river Main

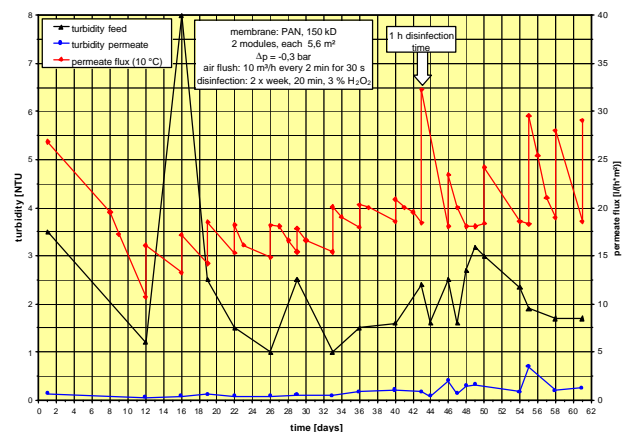


Figure 3: Flux and turbidity over time for the experiment at the river Rhein

CONCLUSION

The experiments indicate that fouling on ultrafiltration membranes can be controlled, under certain conditions, by air flush and few disinfections alone. This makes it possible to run an ultrafiltration plant for surface water treatment at low energy and chemical costs. It was also proved that European drinking water guidelines regarding turbidity (limit value 1 NTU) can be met without dosing flocculating agents.