

WATERBOARD RIJN EN IJssel CHOOSES FOR MBR

First Dutch full scale MBR application on WWTP Varsseveld

Waterboard Rijn en IJssel has decided to realize the first full scale application of membrane bioreactor technology on a communal WWTP in the Netherlands: Varsseveld. Its scale and capacity (750 m³/h and 25.000 p.e.) forms a necessary intermediate step between pilot-research and large scale applications in the Netherlands. Varsseveld WWTP discharges its effluent in a small and ecologically important running water. As its water quality during dry summers is largely dependent on effluent, further improvement of effluent quality will contribute to its ecological function.

The present Varsseveld sewage treatment plant (WWTP) was built in 1971: a medium loaded activated sludge system without primary clarification. Simultaneous precipitation in the aeration tank takes place. For several reasons, this WWTP needs upgrading.

Waterboard Rijn en IJssel anticipates on near future waterquality standards (MTR = maximum tolerable risk, the Dutch environmental standard based on ecotoxicological risk), especially regarding surface waters with a distinct ecological role or function. Varsseveld WWTP discharges its effluent in a small running water, called Bovenslinge, serving as a regional ecological stepping stone. As its waterquality during dry summers is largely dependent on effluent, further improvement of effluent quality will contribute to its ecological function. In figure 1 the aimed waterquality targets are shown in comparison with MTR and current European (EG/EC) regulation.

In addition, the current status of Varsseveld WWTP needed upgrading, because of high odour- and noise emissions;

insufficient biological capacity; stricter effluent requirements regarding phosphorus- and nitrogen removal and necessary technical upgrading.

Conventional upgrading compared to MBR application

Two comparable WWTP's (Ruurlo and Wehl) were recently upgraded in the conventional way ('Effluentpolishing op rwzi's Ruurlo en Wehl: een primeur', J. Wouters en P. Schyns. H₂O (32), nr. 19). To reach the - here also applying - stringent effluent quality requirements, these WWTP's were rebuild as ultra low loaded activated sludge systems, with continuous flocculation in sand filters as a final treatment step. Both operational and qua effluent quality, these WWTP are doing very well.

However, even better effluent quality can (potentially) be reached by the new biomembrane technology. In addition, other developments led to the conclusion that this technology needed to be carefully studied as an option for Varsseveld:

First, MBR application on communal waste water, and under Dutch circumstances, came technically within reach as a result of recent R&D-research. Second, the price of membranes was dropping. Third, MBR effluent quality meets (future) standards, not only for nutrients and suspended solids, but also for bacteria, viruses, heavy metals and organic contaminants, which is interesting for a receiving surface water like Bovenslinge. Fourth, MBR installations can be build very compact and modular. And latest but not least, early MBR experience on this scale could bring the waterboard technological advantage, to be used in future projects.

Therefore, a feasibility study was carried out, in which technical as well as financial aspects were involved. The study affirmed the advantages but made also clear that the waterboard was to be faced with higher investment- and exploitation costs, amongst others due to extra safety and back-up in the construction, higher energy consumption and a relative fast write off of the membranes. Further it became clear that, although the use of MBR for industrial applications is 'proven technology', this is not yet the case for municipal water treatment. Rijn en IJssel thus distinguished the future value of MBR technology, and showed the willingness to play a role in its development, but wanted the extra costs and risks to be shared with other parties.

MBR-development in the Netherlands

Other Dutch waterboards, the Foundation of Applied Water Research (STOWA), the Directorate-General for Public Works and Water Management, and several private companies all have great interest in the MBR development. As a result, cooperate research is being carried out on a pilot scale, ongoing from march 2000, at the WWTP

Fig. 1: Effluent requirements for Varsseveld STP (april - october) related to MTR and EG/EC-regulation. There is no MTR-value regarding suspended solids, it is stated as 'no visible pollution allowed'.



