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## Biological Aerated Filters

# BAF 2

**Cranfield University**  
**12<sup>th</sup> June 1996**

**Organised by:**  
**The School of Water Sciences, Cranfield University**  
**In conjunction with The IChemE Water Subject Group**

Editors – Professor Tom Stephenson and Dr Bruce Jefferson

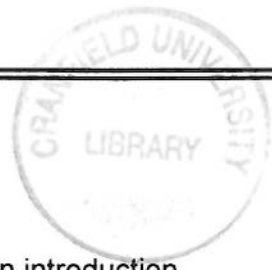
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**2nd Symposium on Biological  
Aerated Filters (BAF2)  
12 June 1996**

Following the success of the first BAF symposium held here in 1993, Cranfield University's School of Water Sciences is holding a second one day symposium on Biological Aerated Filters.

Over the last three years there has been a great deal of work on the development and optimisation of what has become one of the leading processes in wastewater treatment. The aim of this second symposium is to introduce recent work carried out in this field, bringing together many of the world's leading exponents of BAF technology and its application.

BAF2 represents an ideal opportunity to update your knowledge of these developments.

**BAF2 Programme**

- 9:30 Registration and coffee
- 10:25 Chairman's morning introduction
- 10:30 Trouble shooting and optimisation of BAF systems.  
A Smith, Thames Water
- 11:00 Pilot scale comparisons of floating/sunken media and up/downflow BAFs.  
A Mann, School of Water Sciences, Cranfield University.
- 11:20 Combined treatment of dairy and municipal wastewater in BAFs.  
Howard Rundle, Tetra (Europe) Ltd.
- 11:40 North European experience of BAFs.  
P Sagberg, Veas, Norway.  
(to be confirmed)
- 12:00 The Poole Harbour wastewater treatment works.  
P Brewer, Wessex Water Engineering.

- 12:30 Lunch
- 2:00 Chairman's afternoon introduction
- 2:10 The moving bed biological aerated filter  
T Stephenson, School of Water Sciences, Cranfield University
- 2:30 Operational trials of different proprietary Lamella and BAF systems.  
F Budge, Halcrow Consulting Engineers and D Gorrie, Grampian Regional Council.
- 3:00 Aeration optimisation in biological aerated filters.  
P Pearce, Thames Water.
- 3:30 Operating performance and future development of the Biobed system.  
A Cantwell, Brightwater Engineering.
- 4:00 *Close of Meeting and Tea*

**The School of Water Sciences**

The School of Water Sciences is the UK's only academic centre to specialise in process technologies for water and wastewater treatment. The school has considerable experience in research and development, working with many of the world's leading water companies and organisations concerned with water and effluent treatment. This experience ensures that the school is well positioned to offer consultancy and research and development related to these process technologies. The School has particular expertise associated with biotechnological applications including BAFs.

In addition to research and development and consultancy, the School of Water Sciences is recognised as a leading centre for the training of process technologies with funding from the EPSRC and approval of its programmes from the IChemE and CIWEM.

BAF and the biotechnology short courses have been developed to advance the understanding and implementation of these technologies.





## **OPERATING PERFORMANCE AND FUTURE DEVELOPMENT OF THE BIOBEAD™ SYSTEM**

by A.D.C. Cantwell, C.Eng, BSc, PhD, MICHE, MCIWEM. Brightwater Engineering

This paper reports on the performance of the Biobead™ version of the Biological Aerated Flooded Filter Process over the last few years. More than twenty of these units have been installed in the U.K. and the operating experience has enabled further development steps to be made, the range of application to be widened and the design methods associated with the technology to be refined.

Operating problems have arisen when the design load is less than that found upon commissioning. For the BAFF system because of the short retention times within the media bed it is essential that excess dissolved oxygen is present at all times. Diurnal peaks in load must be allowed for in design. A related problem is that of septic influent. Septicity has a profound influence on the development flora and fauna in any biological system and so it is preferable that septicity is corrected outside of the BAFF system. Similarly intermittent saline intrusion will reduce performance, although to a lesser extent than that found on Activated Sludge processes. The final problem with BAFF's is that of media quality which is exclusively a quality control problem.

The major engineering change introduced to the Biobead system is the aeration system which is now a simple sparge tube immersed in the media. This increases the allowable air rates and is particularly helpful in designing for larger than normal diurnal variation. Similarly, the air scour system now used an array of simple drop tubes. The performance of the media has been further improved by the use of charge neutralising additives to the plastic formulation together with broadening the range of source materials able to produce the textured surface finish. Modules of any size can be produced by assemblies of smaller modules of proven engineering performance.

The range of application of the Biobead technology is:-

- tertiary nitrification
- carbonaceous treatment
- solids removal plus nitrification
- solids removal plus carbonaceous treatment.

Results of typical stand alone nitrification are presented together with those for carbonaceous treatment. Two interesting examples are presented where tertiary nitrification is performed upon secondary trickling filter where humus tanks have

- a) completely eliminated and
- b) partially eliminated.

A further example shows elimination of primary treatment can be achieved.



Further developments will explore the use of existing and ring media after primary treatment to achieve UWWT standards without aeration.

In conclusion it has been found that when correctly applied the Biobead system will produce good results. Improvement to the design process and engineering features gives added robustness.

