

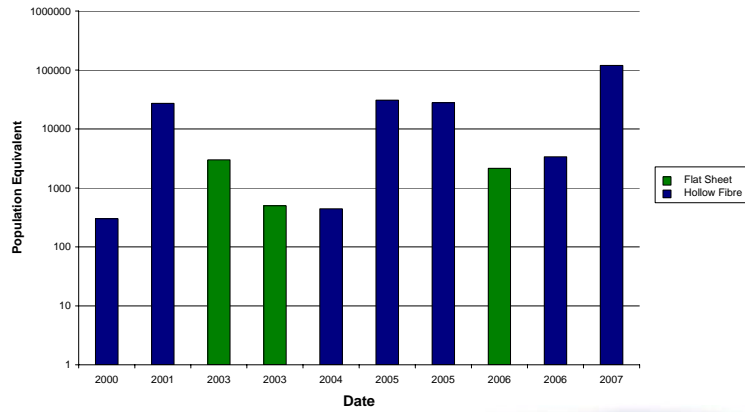


# Foaming in MBR Systems Causes and Control

Sarah Williams  
February 2007



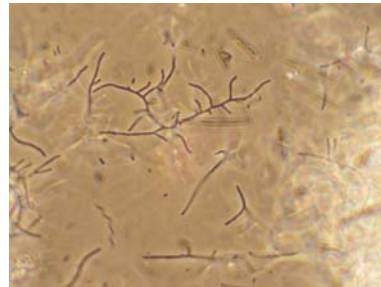
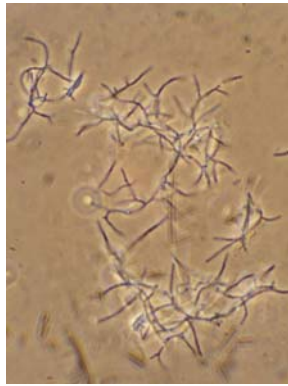
## Biwater Treatment – MBR Scheme Capacity



## Biological Foaming



## Foam Analysis: Nocardioforms and Microthrix



## Factors Affecting Filament Growth

### Conditions Associated With Filamentous Growth

Long sludge age (high MCRT)

Low F:M

Presence of anoxic, anaerobic and  
intermittently aerated zones

Foam trapping and recycling



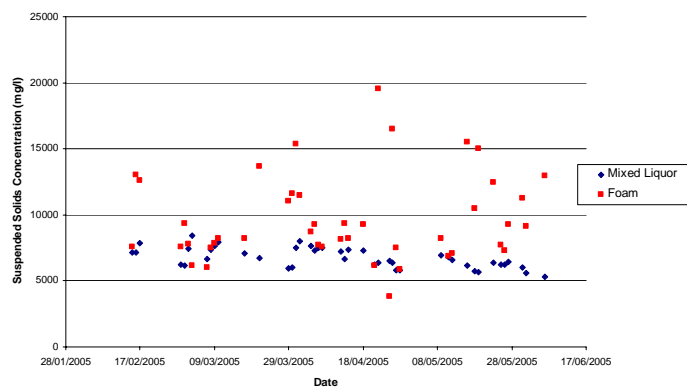
## Mechanism of Foam Formation



- *Nocardia* and *Microthrix* have hydrophobic cell walls
- Attach to air-water interfaces (bubbles in aeration system)
- Float flocs to the tank surface
- Liquid drains and the foam becomes more concentrated



## Comparison of Mixed Liquor and Biological Foam Concentrations



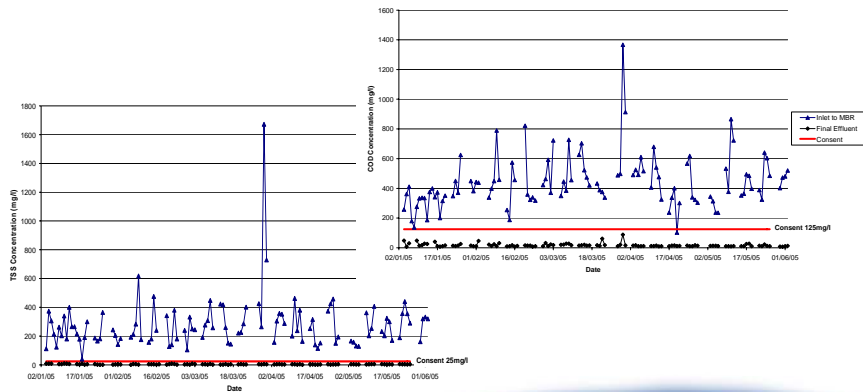
## Fine Bubble Aeration



## Coarse Aeration



## Permeate Quality



## Potential Issues

- Visual
- Process
  - Level measurement and control
  - Sampling and analysis
  - Solids inventory
- Health and Safety
  - Risk of overtopping tank walls
  - Contamination

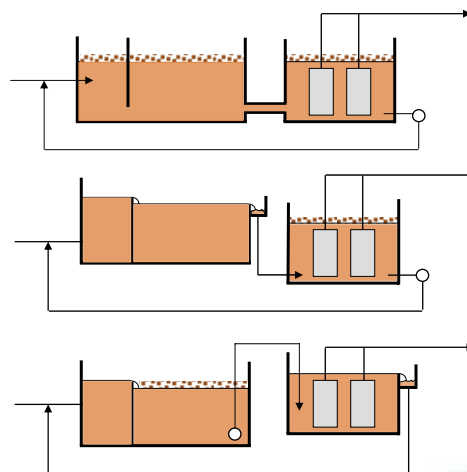


## Foam Control Strategies

- Prevention
  - Selectors?
  - Avoid foam trapping and recycling
- Control
  - Suppression: Antifoam, physical knock-down
  - Surface Removal
  - Mixing and wastage with SAS



## Foam Trapping



Trapping by walls and baffles causes water to leave the treatment unit by a subsurface route rather than overflow.

Examples:  
Anaerobic tanks  
Anoxic zones  
Membrane trains



## Knock-Down Sprays



- Reduce the depth of the foam layer
- Foam has a tendency to form again downstream
- Membrane capacity must be sufficient to treat the additional flow



## Surface Removal



- Remove foam only or foam + SAS
- Take the solids content of foam into account. Foam can be a significant proportion of the wasted sludge
- Don't return foam to the head of the treatment works
- Don't contaminate other activated sludge plants



## Mixing Into Tank Contents



Before



After 16 Hours



## Conclusions

- All types of activated sludge plants can contain *Microthrix* and *Nocardia*, but certain features of MBRs may increase the likelihood of biological foaming
- Consider the possibility of foam at design stage
  - Level control
  - Design to avoid trapping and recycling
  - Consider including control or removal equipment
  - How will it be handled / treated?



Any Questions?

