

FILAMENTOUS BACTERIA – BULKING AND FOAMING IN SLUDGE PLANTS



The Australian Water Quality Centre (AWQC) is dedicated to ensuring and responding to the public health requirements relating to the provision of water and wastewater services for communities in Australia and across the world.

— Specialist water services

Ensuring public health

Bulking and Foaming in Activated Sludge Plants

Activated Sludge Plants (ASP) can suffer from several solids separation problems related to the nature of the activated sludge floc; two examples are bulking sludge and foaming. These issues can cause an increase in plant maintenance and significant deterioration in plant effluent quality due to carry over of suspended solids and residual foam. Both operational issues arise due to the proliferation of filamentous bacteria.

Filamentous bacteria are considered to be a normal component in the microbial community in healthy activated sludge plants which show no symptoms of either bulking or foaming. They also play a key role in floc formation and assist in rapid solid separation. However, under adverse conditions, excessive growth of filamentous bacteria can result in bulking or foaming episodes which reduces the capacity and performance of the plants.

Filamentous bacteria are highly diverse, and proliferate under very different conditions; so a detailed audit of ASPs with bulking problems is recommended to identify and tailor appropriate control measures.

Case Study

AWQC's research and microbiological laboratory departments performed a comprehensive 12 month survey to investigate the occurrence and seasonality of 21 different groups of filamentous bacteria at nine South Australian ASPs. This project established baseline data for periods of operation when no bulking or foaming was evident to gain a better understanding of the 'normal' filamentous flora in each of the ASPs.

Following this, the project successfully linked filament abundance and diversity with environmental and operational parameters and demonstrated how shifts in the 'normal flora' affected sludge settleability. This knowledge was transferred to plant operators to tailor bulking control and management strategies for individual plants.

Identification of Filamentous Bacteria

Identification of filamentous bacteria is an important component to ASP management. Each species of filamentous bacteria can lead to a specific problem. Identifying the dominant species helps to control the problem and find a solution.

Method

The identification of filamentous bacteria is an in-house developed method which uses the following approaches:

1. Wet mounts using phase contrast microscopy are used to identify and quantify Protozoa, Macro-invertebrates, Spirochaetes and Zooglea.
2. Stain microscopy using Gram stain, Neisser stain and Sudan Black stain is used to identify and quantify filamentous bacteria.



Sampling Requirements:

- Sterile 300ml PET bottles
- Sodium thiosulphate dosed
- Air gap essential
- Transport and store at 4 °C
- Transport in individual snap-lock bags.

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