

Microbe ID™

General Overview

Overall the plant looks like it's running well. No major operational changes are advised although the evaluation suggests that septicity and oil and grease should be monitored

Mixed liquor overview

The flocs were firm with an average size of 200-400 um. Stalked ciliates and stalked ciliate colonies were the predominant higher life form with some free swimming ciliates. This indicates that treatment is good and the plant is healthy. Filaments are present at a very common abundance, and don't appear to be causing trouble with settling, although some filaments as well as spirochaetes and spirilla may be contributing some turbidity to the supernatant (clear liquid above the settled sludge). Zooglea (globular and fingered) are present in the flocs at a common abundance and there are a few tetrads. These grow due to certain organic acids and alcohols present in the waste. The reverse india ink stain was normal indicating that nutrients are not limiting to the process. PAOs (polyphosphate accumulating organisms) were viewed at a common abundance indicating that there is a good degree of biological phosphorus removal occurring.

Filament	Rank	Abundance	Cause
Microthrix Parvicella	1	Very common	Oil and grease Longer SRT Septicity
Type 0961	2	Common	Organic acids
Thiothrix I	3	Few-some	Organic acids Sulfide
Type 0675	3	Few	Low F/M Longer SRT

Summary of findings from mixed liquor sample

The “big picture” here is a well operating plant with some septicity and oil and grease. Microthrix Parvicella is the predominant filament and grows due to oil and grease and septicity at a longer sludge age. Some of this is in the floc and some is in the bulk liquid between the flocs. When Microthrix is present in the bulk liquid (between the flocs) there is a higher potential for foaming as this filament is hydrophobic in nature.

Spirilla and spirochaetes are present at a common abundance in the bulk liquid between the flocs. These occur due to septicity and/or low DO. This is most likely due to septicity as low DO filaments were not present. The type 0675 is insignificant at a low abundance. Type 0961 grows on organic acids. Organic acids are formed under areas where bacteria ferment waste in the absence of oxygen. These are often present in industrial waste and septage, may occur from digester decant and sludge handling side streams, or may be formed in areas such as the collection system, primary clarifiers (especially with co-thickening of WAS in the primary), and any other areas where there is BOD present and lack of oxygen.

Recommendations

No operational changes are recommended at this time; however it may be a good idea to monitor and try to discourage the Microthrix Parvicella if it becomes more abundant and/or causes foaming problems. Typically long term strategies for Microthrix control are reducing the sludge age to less than 8-10 days (sometimes even less, with caution as to not disrupt nitrification), reducing septicity, and reducing oil and grease. Short term strategies for Microthrix control involve chlorination and the use of PAX-14.

Septicity can be monitored through an organic acid profile and ORP measurements throughout the system. To monitor organic acids use method TNT872 from Hach (with spectrophotometer) or standard methods #5560c can be used. An increase in organic acids in a particular area or a decrease in ORP is a sign that these areas are septic and steps may be taken to raise the ORP in these areas. Organic acids >100 mg/L are a known cause for filamentous and Zooglea bulking. Of note, there looks to be successful biological phosphorus removal occurring and organic acids (volatile acids) are the food source for these bacteria. A certain amount of septicity is desired for successful operation of this process, while too much can help contribute to problems.

Report Details

Report and pictures courtesy of Ryan Hennessy and Woodard and Curran
<http://www.woodardcurran.com/>



