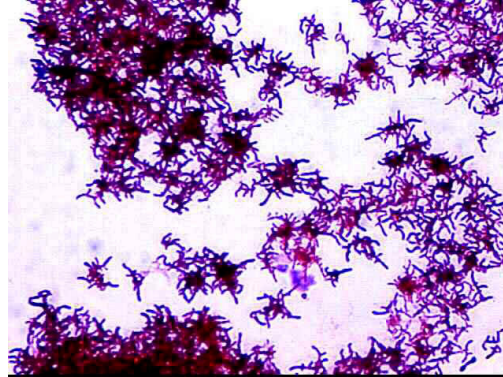


Know Nocardia

By Don Van Veldhuizen, Circuit Rider

Imagine this; you accept a position in a beautiful resort. Outdoor activities abound, wildlife around every corner and all you need to do is operate the wastewater treatment plant. You think, this just doesn't get any better! You enter the plant and immediately, you take back your thought...Doesn't get any better? First, odors, the pungent rotten egg odor permeates everything. You, as the operator, begin to receive complaints daily, even from your family as you greet them with your newfound aroma. The odor is not the only issue, light brown glossy foam on top of the aeration basin and not just a little, at times the foam is so bad it flows over the wall and into the clarifier on one side and onto the ground on the other. Finally, settling, or lack of depending how you look at it. You look in the clarifier and see the blanket. This may be a situation you have had or may have so let's freshen up on some trouble shooting skills.

a capacity of thirty-two thousand gallons and is the same as any other in the area.



Looking under the microscope, you see a lot of floc along with many formations that appear similar to broken tree branches.

The challenge you are experiencing is easy to see. It's that pesky little bacteria called Nocardia. Now, let's try to figure out how to get rid of it and, better yet, how to keep it from returning.

A common practice to get rid of Nocardia is the use of chemicals, specifically chlorine. There are two common practices of application. The first is to inject 5-10mg/L chlorine into the RAS. The problem with this is chlorine is an indiscriminate killer of bacteria, the good and the bad. It will kill all bacteria it comes in contact with. The bacteria inside the floc will survive in theory but you would be reducing your overall population of bacteria. This will kill the Nocardia that is in your mixed liquor, but the foam will still be a thriving colony, as it will have no contact with the chlorine. The second theory involves using a solution of 50-100mg/L chlorine in a spray container and spraying the foam. This will knock down the foam colony without affecting that which is in the mixed liquor. You can do both which will kill Nocardia in both, but what about it returning?

A recommendation that I would suggest is first work towards forming an environment that will not favor Nocardia.

Nocardia like a low Food: Microbe (F/M) ratio, typically below 0.05 but can be below 0.07 if the right conditions apply. Nocardia are slow growing when compared to other bacteria, so old sludge favors them. For figuring the F/M ratio, take the pounds of BOD entering system and divide pounds

LAB RESULTS

Influent Data:

Influent BOD 180mg/L
Influent TSS 240mg/L

Aeration Basin Data:

MLSS 2450mg/L
MLVSS 2200mg/L

Settleometer	minute	ml/L
	5	990
	10	950
	15	910
	30	880
	60	850

pH 6.2
Temperature 15°C
DO 1.3mg/L

Here is some data on the plant:

The incoming wastewater (influent) is from a resort community with not many residences and many restaurants, fast food, etc... Influent flow averages fifty-two thousand gallons per day. Your primary treatment consists of a grit channel and grinding of any solids along with the flow meter to measure the influent. You have two aeration basins each with a capacity of fifty-five thousand gallons. They use coarse air diffusers and the effluent from the basins removed is one foot below the surface in which it enters the clarifier. The single circular clarifier has

MLVSS under aeration. Using the pounds formula, it is determined that you have about 78 lbs of BOD entering the system and 2,018 lbs MLVSS under aeration. This would give you an F/M ratio of 0.039. This would tell you that you need to increase wasting to give you a lower MLVSS in your aeration basin and in turn a higher F/M ratio. Settling is very poor and unless your system is different from this one, space in your digester is limited. A good way to increase wasting without increasing volume is to add a settling aid such as a polymer. Be aware that many polymers have a very high food content, some as high as 4000mg/L BOD. Broadcasting a dry form of polymer over the aeration basin will coagulate the foam as well as the floc in the mixed liquor and improve settling in your clarifier. This will allow you to waste the same volume at a higher concentration therefore more pounds of solids will be wasted out of the system.

Nocardia do well in a low DO environment (<1.5mg/L DO), but can also thrive in a high DO environment (>3.0mg/L DO). It is best to maintain a DO between 2.0 and 2.5mg/l. Therefore, it would be wise to increase the air.

Nocardia love grease, so remove their favorite food source. As restaurants can often discharge a lot of grease, actions may be possible to reduce this. Public education is one-way, city ordinances is another. The only other option is costly and may involve a major upgrade to your system to remove grease by adding/improving primary clarification.

LAB RESULTS		
Influent Data:		
Influent BOD	180mg/L	
Influent TSS	240mg/L	
Aeration Basin Data:		
MLSS	1450mg/L	
MLVSS	1300mg/L	
Settleometer	minute	ml/L
	5	720
	10	630
	15	560
	30	510
	60	470
pH	6.2	
Temperature	15°C	
DO	2.0mg/L	

Often by making process changes in activated sludge, it will remove the problem and the adding of

chemicals such as chlorine may not be necessary. For this system, the F/M ratio was increased to 0.06 to 0.07 by increased wasting. A long chained cationic polymer was used in the aeration basin. The DO was increased to 2.0mg/L and grease traps were installed in a majority of the restaurants. Typical lab results averaged as follows:

The plant also saw a dramatic improvement in effluent quality, but one important note that when making changes to activated sludge systems, it is good not to make changes rapidly (no more than 10% per day).

The visual appearance of the treatment process improves immediately and the odors will dramatically decrease. It may be so much that you no longer receive mysterious gifts of pine tree air fresheners.