

Case study

AstraZeneca, Sweden
Pharmaceutical



Highlights

General information

Client

AstraZeneca, Södertälje, Sweden

Challenge

AstraZeneca had a complex and toxic wastewater and their demands for a new wastewater treatment process were harsh: total detoxification and more than 95% removal of complex organic compounds.

Solution

A unique biological treatment process based on Natrix™ suspended biofilm were chosen: microfungi take care of toxicity in a three-stage reactor, while bacteria reduce TOC in the following three reactors.

Discharge limits

Toxicity:	None measurable
TOC:	> 95 %

Background

In 1992, AstraZeneca approached AnoxKaldnes in order to obtain a state of the art solution for a new treatment plant. The wastewater from the pharmaceutical production was highly toxic and in addition contained many difficult-to-degrade organic compounds. The recipient was the very sensitive Lake Mälaren, which surrounds several cities including the capital Stockholm.

To be able to discharge the wastewater into Lake Mälaren it had to be totally detoxified and at the same time at least 95% of the organic content had to be removed.

Solution

Several activated sludge processes were initially unsuccessfully tested. The main problem was that the wastewater was toxic not only for animals and plants but also for the bacteria used in biological treatment processes. An R & D project was then launched based on the newly developed Natrix™ biological process.

It was demonstrated that only certain microfungi could resist and break down the toxic compounds. A tailor-made treatment process in six stages was developed. In the first three MBBR reactors fungal growth is promoted by lowering pH to 4. In the following three stages, when the wastewater was detoxified, pH is adjusted to 7 to promote bacteria that take care of the residual organic compounds.

Dimensioning

The flow is approx. 1800 m³/d. Incoming TOC averaging 440 kg/d but varies considerably because of batch-wise production.

The hydraulic retention time in each reactor is 3-4 h. The biological treatment process is complemented with chemical phosphorous precipitation and polishing with activated carbon and a sand filter to take care of any residual toxicity and suspended solids, respectively.

Results

The treatment plant has been operational since 1997 and the treatment results have been superior. In addition, the built-in tolerance to peak loads and toxicity in the Natrrix™ biological process has provided a very stable operation that could not have been obtained with conventional treatment processes.

The treated wastewater is totally detoxified by the action of the microfungi that also takes care of 80% of TOC. The bacterial communities in the following reactors remove additional organic substances so that

the overall TOC removal is 97%. Approximately 80% of incoming nitrogen is removed (far more than the discharge limit). Phosphorous removal is 99%.

During the years, environmental studies of the discharge point have shown that the recipient has not received any residual toxicity from the treatment process and that the amounts of nitrogen, phosphorous, COD and suspended solids have decreased in the area.

