

## AstraZeneca, Södertälje Sweden

### The Client

*AstraZeneca is a British-Swedish multinational pharmaceutical company founded in 1999 through the merger of Sweden-based Astra AB and UK-based Zeneca group. Being the world's fifth largest pharmaceutical company, it has operations in more than 100 countries.*



### The Client's Needs

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 free from toxic chemicals and at the same time at least 95% of the organic content had to be removed.

### The 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. Therefore, an R & D project was launched based on the AnoxKaldnes™ MBBR technology. 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 was promoted by lowering pH to 4. In the following three stages, after the wastewater detoxification, pH was adjusted to 7 to promote bacteria for the reduction of residual organic compounds.

### Dimensioning

The flow is approx. 1,800 m<sup>3</sup>/d (0.48 MGD). The incoming TOC averages about 440 kg/d but varies considerably because of batch-wise production. The hydraulic retention time in each reactor is 3 to 4 hours. The biological treatment process is complemented by chemical phosphorous precipitation as well as polishing with activated carbon and a sand filter to take care of any residual toxicity and suspended solids.



### Results

The treatment plant has been operational since 1997 and the treatment results have been excellent. In addition, the built-in tolerance to peak loads and toxicity in the MBBR 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 take 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 receiving lake has not been subject to any residual toxicity from the treatment process and that the amounts of nitrogen, phosphorous, COD and suspended solids have decreased in the area.

