

# AnoxKaldnes™ MBBR Proves Effective at Asphalt Refinery

## Oil & Gas | Case Study

### The Client

As one of the largest independent liquids terminal and pipeline operators in the nation, the company has over 8,500 miles of pipeline plus many terminal and storage facilities that store and distribute crude oil, refined products and specialty liquids.

At its asphalt refining facility in the Northeastern U.S., effluent from the wastewater treatment plant is discharged to the local sanitary sewer system (POTW). The POTW pretreatment standards require the treated effluent to contain less than 100 mg/l ammonia and less than 100 mg/l BOD.



*The MBBR carriers provide protected surface area to promote biological growth.*

### Key Figures

- Design flow 172,860 gpd
- Peak flow 201,600 gpd
- Temperature 21 – 34°C

### The Client's Needs

The refinery needed to upgrade the wastewater treatment system to prepare for expected changes brought about by the use of a new crude feedstock. The new wastewater was predicted to contain elevated concentrations of TDS and conductivity.

The plant had installed systems to remove the majority of oils and grease, organics and sulfides from the wastewater. However, a biological treatment step was needed to meet the discharge requirements. In addition, an easy-to-operate, robust and reliable biological treatment system that could fit into a very small available footprint was required.



### The Solution

Veolia Water Technologies supplied an AnoxKaldnes™ Moving Bed Biofilm Reactor (MBBR) treatment system to reduce the BOD and ammonia in the effluent. Veolia provided the process and detailed design engineering to size the MBBR system, specifying all components in chloride-resistant materials of construction because of the high chloride concentration of the wastewater (3,500 mg/l). Equipment included the MBBR media, blowers, instrumentation and custom-designed aeration basin laterals and effluent sieves fabricated from Zeron 100 and 2507 SS. Veolia also provided start-up assistance and process engineering support that enabled the biological system to successfully acclimate to the high-TDS wastewater.

The MBBR system was started up in May 2012. Sewage seed sludge was slowly acclimated to the high-TDS (14,000 mg/l) wastewater. Samples collected for permit compliance demonstrated that the COD/BOD, ammonia, total suspended solids and oil & grease limits were well below the POTW discharge limits.

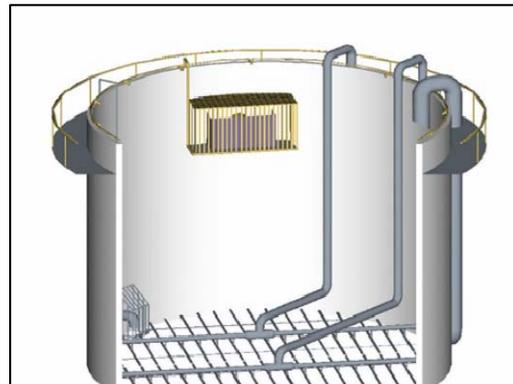
## Process Description

The AnoxKaldnes™ MBBR is a stand-alone biological treatment system with no need for media backwashing. It is a fixed-film process that does not require sludge to be recycled back to the unit. The process utilizes 10- to 25-mm-diameter cylindrical plastic media retained in tanks to provide an environment in which bacteria and protozoa can grow effectively. Aeration supplied to the tanks provides both the oxygen essential for microbial growth in aerobic designs and the energy required to disperse the carriers completely throughout the system.

The refinery's AnoxKaldnes MBBR system consists of two 21.5-ft-diameter circular shop-fabricated FRP tanks operated in series: one for BOD reduction followed by one for nitrification. Both tanks are 29-ft straight depth.

Each tank is equipped with an outlet sieve to retain the media, the media itself, and an aeration grid. The aeration system generates a medium bubble. Because of the high concentration of chlorides in the water, the design specified Zeron 100 and 2507 SS aeration grid, and 2507 SS sieves. Aeration grid diffusers were made threaded and removable to be disassembled/reassembled inside the FRP tanks.

An important feature of the process is that biofilm thickness is controlled by the movement of the media, such that oxygen diffusion through the film is encouraged. Sloughed or detached biofilm becomes suspended and leaves the reactor with the treated water to be captured in an Induced Air Flotation (IAF) unit downstream of the MBBR.



## Benefits

- Small footprint biological treatment system
- Simple, reliable and robust operations without the need for sludge recycle
- The air flow pattern created by the media enables the use of rugged stainless steel, non-clogging, medium-bubble aeration laterals that achieve close to fine-bubble oxygen transfer efficiencies.
- The effluent sieves are continually scoured clean by the suspended fixed-film media. No cleaning or maintenance is required.

## Did You Know?

MBBR technology was invented by Hallvard Ødegaard in the mid-1980's in conjunction with a small Norwegian company, Kaldnes Miljøteknologi (KMT) with funding from the Norwegian government. The first MBBR was installed in Steinsholt, a small village in Norway in 1989. KMT merged with the Anox company of Sweden to form AnoxKaldnes, which was purchased by Veolia in 2007.

Because the origin of the AnoxKaldnes™ brand is the inventor of the technology, the experience and process expertise of AnoxKaldnes is unparalleled by any other MBBR provider in the marketplace. Since its inception, AnoxKaldnes has continually improved and expanded the process capabilities of this technology through an extensive program of research and development.

### Veolia Water Technologies

tel. +1 412-809-6000 or +1 800-377-0777

[water.info@veolia.com](mailto:water.info@veolia.com)

[www.veoliawaterstna.com](http://www.veoliawaterstna.com)