

MOLEAER ENHANCES AND ELIMINATES ODORS IN LAGOON-BASED TREATMENT SYSTEM

Wastewater Treatment Plant on Zirku Island, Abu Dhabi - United Arab Emirates

Zirku Island, operated by the Zakum Development Company (ZADCO) of Abu Dhabi, is located 140 kilometers northwest of Abu Dhabi. With its advanced oil and gas installations, Zirku is considered the main industrial base for the processing, storage and export of oil from the Upper Zakum, Umm Al-Dalkh and Satrah oil fields operated by ZADCO.

Zirku Island also accommodates a variety of personnel stationed there. Historically, all wastewater generated on the island has been fed to SIX water stabilization ponds situated on an elevated section of the island. Part of the treated water is then used to irrigate the surrounding landscape and gardens. The remaining treated water is discharged into a valley where it is allowed to either seep into the ground or evaporate.

The Zirku wastewater treatment system was originally designed for a fraction of the amount of people currently living on the island. Due to the daily flow rates and corresponding pond sizes, the hydraulic retention time (HRT) did not allow for sufficient treatment. The ponds frequently produced foul odors and served as the source of complaints from the staff on the island. The holding capacity and flow rates are not the only limiting factors; very hot summer temperatures, warm water and insufficient aeration were creating very low dissolved oxygen (DO) levels, further compounding the poor treatment process. Consequently, ZADCO enlisted the assistance of an independent consultant to determine if their current treatment system could be boosted with nanobubble aeration to avoid a major capital upgrade.

Client:	Zirku Island, Abu Dhabi, U.A.E.
Type:	Industrial wastewater, Lagoon-based system
Daily Flow:	1,585,000 gallons per day
Treatment Capacity:	1,717,000 gallons
HRT:	24 hours
Unit Type:	Moleaer™ XTB
Installed:	April 20, 2016



The project's primary objectives were as follows:

- Supplement the existing aeration system with nanobubble aeration to increase DO levels in the primary pond
- Eliminate foul odors from the primary pond
- Reduce Biological Oxygen Demand (BOD) levels

The Moleaer XTB Nanobubble Generator™ was installed adjacent to the primary pond with a recirculation pump. The raw wastewater was pumped through the generator and back into the pond. Despite the warm water temperature, the introduction of nanobubbles was able to raise the dissolved oxygen. Most importantly, the nanobubbles were able to deliver oxygen to the entire water column, especially down to the bottom sludge layer, thus aiding in odor reduction. The presence of the nanobubbles helps boost the biological respiration rate (a.k.a. "SOUR") of aerobic bacteria and suppresses anaerobic activity that would otherwise be responsible for the production of foul-smelling gases. Within 24 hours of the introduction of the nanobubbles, the following was observed:

- DO levels rose to 7.0 ppm, more than 4x greater than normal pond conditions
- The BOD decreased from 110 mg/l to 45 mg/l.
- Foul odors started to abate



Supplemental aeration with the Moleaer XTB system proved that nanobubbles deliver higher and more stable levels of DO in a warm water environment. It further validated that nanobubbles can enhance an aerobic treatment process and increase the capacity of a system by efficiently reducing the loading.

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