

I-BOx® Biological Odor Control System Eliminates Odors at South African Wastewater Treatment Works

As part of a 187 million Rand (US\$12.5 million) plant expansion, the Buffalo City Municipality (BCM) installed an I-BOx® 7010 odor control system supplied by Integrity Municipal System LLC (IMS), at its Reeston Wastewater Treatment Works (WWTW). BCM, located on the east coast of Eastern Cape Province in South Africa, recently upgraded the Reeston WWTW in East London to increase its capacity to 12.5 megalitres (Mℓ) per day (~3.3M GPD). The expansion was undertaken in response to population growth that had overloaded East London's treatment system. The expanded WWTW can now service not only the Reeston community, but greater East London as well. When complete, the project increases the capacity of the Reeston WWTW from 2.5 Mℓ/day (~660k GPD) to 12.5 Mℓ/day (~3.3M GPD).

“The expansion of the Reeston WWTW is a critical component in unlocking development potential in the central drainage zone,” said BCM acting engineering head Luyanda Mbula, adding that about 300 people were employed during the civil phase of the project. Some of the 28 village areas added to the new BCM boundaries are also expected to be serviced through the Reeston site.

As the site was close to a residential area, the project required an odor control system to ensure no odors escaped the plant. S.A.M.E. Water, part of the wastewater specialist S.A.M.E Group and now known as Africa Water Projects and Construction (AWPC) was awarded the contract to execute this project. S.A.M.E. Water contacted IMS to fulfill the odor control requirement of this project.

“It was really a pleasure working with IMS on this project. The system was easy to install and the performance met the requirements of this project with low operating costs.”

Lee Maartens
Contracts Director at AWPC

IMS designed and supplied its I-BOx® 7010, an advanced, two-stage biological system that provides point source odor control. The system was designed to use a biological reaction phase for the removal of hydrogen sulfide (H₂S) in the first stage using an inert, inorganic media widely used for biological treatment; and an adsorption phase in the second stage to polish residual H₂S and organic odors from the airstream utilizing a carbon-based media.

The airflow capacity of the system was designed at 2,880 m³/h, with average inlet H₂S concentration of 50ppm and peak concentration of 100ppm. The system provides 99% H₂S removal efficiency with an estimated life of 10 years for the biological media.

A media irrigation system is incorporated into the biological system to provide the Stage 1 media with adequate moisture. The irrigation process is controlled by a programmed timing sequence that actuates a solenoid water valve located on the water supply piping. Frequency, duration and start times are adjustable. Stage 1 is intermittently irrigated by either potable water or treated plant effluent water at 30psi (200kPa) (provided residual chlorine concentration is less than 5ppm). The water is sprayed over the top of the media while air is being pushed countercurrent up through the media. As the air passes over the moist media, H₂S and other compounds dissolve into the water film on the surface of the media. The bacteria residing in the water film oxidize these compounds to release energy for sustenance and growth. The water that trickles down through the media rinses away the acidic byproducts of the biological reaction. Nutrients, commercially available fertilizers, are also trickled over the media to enhance and sustain the biological activity. The nutrients, housed in a tank, are dosed into the system by a nutrient pump.

Water and acidic sulfate byproducts washed from the media leave the system through the drain piping at the bottom of the vessel and are returned to the wastewater stream.

Following approval of design submittals, IMS fabricated the I-BOx® 7010 odor control system at its facility in Poway, California USA within the agreed schedule. During the QA/QC inspection and mechanical testing, representatives of S.A.M.E. Water visited the IMS facility to witness testing and inspect the system.

The I-BOx® 7010 biological system was installed by S.A.M.E Water at the inlet works section of the WWTF, as these areas are highly prone to H₂S generation due to the turbulence created by degritters, screens and other equipment.

The system was successfully commissioned and now provides the required removal efficiency and protects local plant personnel and nearby residents from unpleasant odors.

“It was really a pleasure working with IMS on this project,” said Lee Maartens, Contracts Director at AWPC. “The system was easy to install and the performance met the requirements of this project with low operating costs.”



| System Design Information | |
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| Model | I-BOX® 7010 |
| Number of units | 1 |
| Design Air Flow Rate, cmh [cfm] | 2,880 [1,695] |
| Avg. Inlet H ₂ S Concentration, ppm | 50 |
| Peak Inlet H ₂ S Concentration , ppm | 100 |
| Minimum H ₂ S Removal Efficiency, % | 99* |
| System Dimensions | |
| Length, m [ft] | 4.27 [14.0] |
| Width, m [ft] | 2.08 [6.83] |
| Height (SSH), m [ft] | 2.08 [6.83] |
| Shipping Weight, kg [lbs.] | 9,888 [21,800] |
| Operating Weight, kg [lbs.] | 10,569 [23,300] |
| Nutrient Tank and Metering Pump | |
| Nutrient Tank Capacity, L [gal] | 197 [52] |
| Nutrient Pump Flow Rate Lpd [gpd] | 4.5 [1.2] |
| Water Feed Piping | |
| Solenoid Frequency | Every 30 minutes |
| Solenoid Valve Open Duration, min | 1.8 |
| Flow Rate, Lpm [gpm] | 53 [14] |

*The minimum H₂S removal efficiency is 99% or an outlet concentration of 0.1 ppm, whichever is greater.