CASE STUDY

Sanitary District of Decatur, IL

Integrity Municipal Systems' Biological Odor Control Systems Successfully Eliminate Odors

Since 1917, the Sanitary District of Decatur has been the wastewater treatment authority for central Macon County, Illinois. The District provides wastewater treatment for the residents and industries in Decatur, Mt. Zion, Forsyth, Argenta, and Oreana. The original treatment facility was built in 1924 and the current treatment plant was completed in 1990. Prior to 2019, about a half dozen carbon adsorber systems handled the odor control for the east side of the plant, which is located adjacent to a nearby neighborhood. The high concentrations of hydrogen sulfide (H_2S) being treated made it very difficult to keep the carbon absorber systems online.

The carbon media needed replacement and disposal approximately every three months, leading to high operating costs. During the planning stages for new construction on the west side of the plant, the District investigated various biological odor control technologies in a search of better alternatives. The District settled on biological odor control systems over carbon adsorber systems for two major reasons: First, the District knew from experience that carbon adsorber systems require costly and frequent carbon media replacement; and Second, the efficiency, ease of operation, and low operating cost of biological odor control systems appealed to the District.

In 2015, the District and design engineering firm Clark Dietz, Inc. selected Integrity Municipal Systems LLC (IMS) from among several suppliers to provide two innovative, enviromentally-friendly, and sustainable biological odor control systems for the new west side of the plant.

> ***"Working with IMS on this project has been an absolute pleasure. The two Biological Odor Control Units arrived on time and the installation process went smoothly. IMS' staff proved to be professional and helpful during the installation and startup process, which is always appreciated."***
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> *- Kaleb Kampwerth, Project Manager*
> *Plocher Construction*

I-BOx® 8015 Biological Odor Control Systems Installed in 2015

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The IMS I-BOx® 8015 systems selected by the District feature superior performance, compact plug-and-play design, long lasting inert media, minimal routine maintenance, and low operating costs. The performance of the IMS biological odor control systems prompted the District to install additional IMS systems in 2019 when it came time to replace the existing carbon adsorber systems on the east side of the facility. Having virtually no issues with IMS' systems for nearly five years, the District and design engineering firm Donohue & Associates jointly determined to use them for the second project. Plocher Construction installed the systems.

I-BOx® biological odor control systems are pre-assembled, piped, wired, and factory-tested for easy installation and fast start-up at the jobsite. The packaged biological odor control systems consist of an FRP air exhaust fan, FRP odor control vessel, water and nutrient feed panel, nutrient tank, and electrical control panel.

The fans operate continuously and pull foul air from the process area into the biological odor control systems for treatment before release to the atmosphere. The systems use a single biological stage, where the treatment occurs, to remove hydrogen sulfide (H_2S) by providing an environment that promotes the natural growth of acidophilic, sulfur-oxidizing bacteria. The media is an inert, porous, mineral-expanded clay material designed to resist compaction and degradation from the acidic sulfates produced by the biological oxidation of the hydrogen sulfide.

An intermittent water irrigation system is incorporated into the biological system design to provide the media with adequate moisture. Nutrients are also trickled over the media to enhance and sustain the biological activity. The nutrients are commercially available fertilizers stored in an integral nutrient tank and dosed into the system by a nutrient pump mounted in the water and nutrient feed panel. 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 sewer main.

After delivery to the jobsite, the I-BOx® biological odor control systems were installed and started-up. The system specifications require 95% and 80% minimum H_2S removal efficiencies during the summer and winter months respectively. The systems have far exceeded these specifications, averaging more than 99% H_2S removal efficiencies since being placed in operation.

Minimal maintenance keeps operating costs low. The I-BOx® 8015 and I-BOx® 8020 biological odor control systems solved the odor control problem at the Sanitary District of Decatur and will provide Macon County with reliable, efficient,cost-effective and sustainable odor control technology now and for years to come.

Table 1: SYSTEM DESIGN PARAMETERS

System Design Information	
Model	I-BOx® 8015 / I-BOx® 8020
Design Air Flow Rate	3,000 cfm / 3,750 cfm
Number of Units	2 / 2
Avg. Inlet H_2S Concentration, ppm	100 ppm / 50 ppm
Peak Inlet H_2S Concentration , ppm	400 ppm / 100+ ppm
Minimum H_2S Removal Efficiency (S/W)*	95%/80% / 95%/80%
System Dimensions	
Length	19' / 25'
Width	8' / 8'
Height (SSH)	7' / 7'
Shipping Weight	37,000 lbs / 48,000 lbs
Operating Weight	42,000 lbs / 56,000 lb
Nutrient Tank and Metering Pump	
Nutrient Tank Capacity	82 gal / 118 gal
Nutrient Metering Pump Flow Rate	4.2 gpd / 2.6 gpd
Water Feed	
Solenoid Frequency	Every 30 min (each)
Solenoid Valve Open Duration	4.9 min / 4 min
Flow Rate	18 gpm / 18 gpm

** (S/W) = Summer/Winter H_2S Removal Efficiencies. Both vessels are fully insulated for the cold weather.*

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