

## **Integrity Municipal Systems' I-BOx® 5000 Biological Odor Control System Eliminates Odor Problem and Drastically Reduces Operating Costs at Pump Station CBD-8 in Piura, Peru**

Piura, the capital of the Piura Province, is a major city located on the northern coast of Peru. The weather there is sunny almost year-round with temperatures varying between 71°F (22°C) and 100°F (38°C) in the summer. In years when El Niño occurs, temperatures can exceed 104°F (40°C). These high temperatures promote the production of hydrogen sulfide (H<sub>2</sub>S) gas and can lead to odor issues at wastewater facilities.

Pump station CBD-8 is located on a street corner in Piura and surrounded by residential buildings. The facility had been operating a small activated carbon adsorber

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system to eliminate odorous gases. The carbon adsorber odor control system was initially inexpensive to procure; however, removing, disposing of, and replacing spent activated carbon media created very high operating costs, adding up to thousands of dollars per year. Furthermore, the carbon adsorber odor control system was ineffective in handling the odors due to the high inlet hydrogen sulfide (H<sub>2</sub>S) concentrations ranging from 50 to 100 ppm.

The Ministry of Housing, Construction and Sanitation (MVCS) replaced the existing adsorber at pump station CBD-8 with a new system that could achieve the desired level of hydrogen sulfide (H<sub>2</sub>S) removal and reduce operation and maintenance costs as part of a larger project which included construction of a new wastewater treatment plant, installation of sewage pressure pipelines and improvements to two existing pump stations (CBD-8 and 10). In July 2017, after technical and economic evaluations, MVCS awarded the bid to Consorcio SADE-COSAPI, who selected an innovative, environmentally friendly and sustainable hybrid biological odor control system designed by Integrity Municipal Systems LLC (IMS). The replacement system featured superior performance, compact plug-and-play design, long lasting inert media, minimal routine maintenance and low operating costs.

The IMS biological odor control system (I-BOx® 5000) is

pre-assembled, piped, wired, and factory tested to facilitate installation and start-up at the jobsite. The packaged biological odor control system consists of an FRP Air Exhaust Fan, FRP Dual-Stage Odor Control Vessel, Water and Nutrient Feed Panel, Nutrient Tank and Electrical Control Panel.

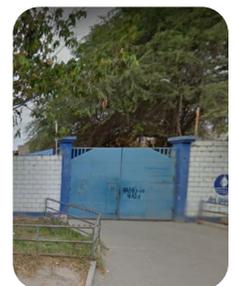
The system's fan operates continuously, pulling foul air from the process area into the biological odor control system for treatment prior to release to the atmosphere. The system is comprised of two distinct process stages: Stage 1, where primary treatment occurs, is designed to remove primarily hydrogen sulfide (H<sub>2</sub>S) by providing an environment promoting the natural growth of acidophilic, sulfur-oxidizing bacteria. The Stage 1 media is an inert, porous, mineral expanded clay material designed to resist compaction and degradation from the acidic sulfates of the biological oxidation of the hydrogen sulfide. Stage 2 is a polishing stage used to remove any remaining hydrogen sulfide as well as other odorous organic compounds.

An intermittent water irrigation system is incorporated into the biological system design to provide the Stage 1 media with adequate moisture. Nutrients are trickled over the

*Pump station  
CBD-8 in Piura*



*I-BOx® 5000 in Piura*



*Old equipment*

## System Design Parameters

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 return to the sewer main.

After delivery to the jobsite in Piura, the biological odor control system was installed and started-up. With inlet hydrogen sulfide (H<sub>2</sub>S) concentrations consistently ranging between 50 to 100 ppm, the system has maintained more than 99 percent hydrogen sulfide (H<sub>2</sub>S) removal efficiency since beginning operation. Minimal maintenance has kept operating costs low.

The I-BOx<sup>®</sup> 5000 biological odor control system solved the odor control problem at pump station CBD-8 and provided the MVCS with a reliable, efficient, cost effective and sustainable odor control technology. Eng. Rolando Panta, Maintenance Chief for EPS Grau S.A., the company responsible for drinking water and sewage service in Piura, summarized the experience with the I-BOx<sup>®</sup> 5000 biological odor control system: "The operation of the I-BOx<sup>®</sup> 5000 is simple and user-friendly for our staff. With the installation of the I-BOx<sup>®</sup> 5000, we solved the odor problem at the CBD-8 pump station and now we experience low operation and maintenance costs. The I-BOx<sup>®</sup> system was installed outdoor and is not affected by ultraviolet rays or the high temperatures in Piura. The I-BOx<sup>®</sup> has been in operation for 2 years and we haven't had any mechanical or electrical problems."

| System Design Information                      |                         |
|--|-------------------------|
| Model  | I-BOx <sup>®</sup> 5000 |
| Design Air Flow Rate                           | 400 cfm                 |
| Number of Units                                | 1                       |
| Avg. Inlet H <sub>2</sub> S Concentration, ppm | 50 ppm                  |
| Peak Inlet H <sub>2</sub> S Concentration, ppm | 100 ppm                 |
| Minimum H <sub>2</sub> S Removal Efficiency    | 99%*                    |
| System Dimensions                              |                         |
| Length   | 7'-6"                   |
| Width  | 5'-0"                   |
| Height (SSH)                                   | 6'-10"                  |
| Shipping Weight                                | 8,000 lbs.              |
| Operating Weight                               | 8,500 lbs.              |
| Nutrient Tank and Metering Pump                |                         |
| Nutrient Tank Capacity                         | 15 gal                  |
| Nutrient Metering Pump Flow Rate               | 0.3 gpd                 |
| Water Feed                                     |                         |
| Solenoid Frequency                             | Every 30 minutes        |
| Solenoid Valve Open Duration                   | 1 minute                |
| Flow Rate                                      | 6 gpm                   |

\*The minimum H<sub>2</sub>S removal efficiency is 99% or an outlet concentration of 0.1 ppm, whichever is greater.