"Super Oxygenation" System Helps Solve Town's Odor Problems

The Town of Fishers is an upscale, residential community in central Indiana. The population of this Indianapolis suburb has skyrocketed over the past 10 years, making it one of the fastest growing cities in the country. However, frequent complaints from residents regarding unpleasant odors from the wastewater treatment plant head works facility and the nearby Allisonville Road Lift Station quickly became a cause for concern for town officials. Another cause for unease involved the rapid corrosion of the pipes within the sewer system.

With the city’s three lift stations in very close proximity to residential neighborhoods, staff needed to find a cost effective, practical odor control solution that would solve their odor and corrosion problems all while being aesthetically pleasing.

Town officials investigated several traditional solutions, but were unhappy with the price and performance. They eventually selected an ECO2 SuperOxygenation System, a technology that dissolves pure oxygen into wastewater to sustain aerobic conditions within the pipe line. This technology offered the Town of Fishers lower operation and maintenance costs, a rapid return on their investment, minimal maintenance that could be absorbed into their existing operations budget, and an environmentally friendly solution. Additional benefits include BOD reduction and protection of capital investment from corrosion.

Odor and corrosion in sewer systems are generally caused by hydrogen sulfide (H₂S) gas. H₂S forms when anaerobic conditions exist within the collection system, and this leads to the rotten egg-like odor generally associated with wastewater treatment plants. In order to eliminate that odor, the ECO2 system dissolves pure oxygen into wastewater at high concentrations (50-200 mg/L). The system does not use any chemicals or moving parts other than standard industrial water pumps. The pure oxygen is dissolved into the wastewater inside of the system’s SuperOxygenation Cone at 90-95% efficiency. This high efficiency does not allow any gaseous oxygen to enter the sewer lines to collect in high spots or be expelled from the discharge.

Three custom built ECO2 systems were installed at three separate lift stations to pre-treat all plant influent and stop odor at the head works. Bulk liquid oxygen is used to produce the gaseous pure oxygen that is then dissolved into the water. The oxygen dissolved at each specific point in the force main is carried all the way to the Chester Creek Wastewater Treatment Plant, eliminating H₂S throughout the entire force main.

Dissolved oxygen levels were increased to 65 mg/L, reducing the average H₂S levels from 20 ppm to 6 ppm with a residual DO of 5-10 mg/L at the WWTP head works. The ECO2 system works by draw-
Pure oxygen is dissolved into the wastewater inside of the system's SuperOxygenation Cone and then the water is put back into the force main to maintain aerobic levels. By using a sidestream of raw, unscreened sewage directly from the force main to be cycled through the conical downflow bubble reactor, a small sidestream pump provides enough pressure to overcome the head loss through the cone and to ensure reentry of the wastewater into the force main. Gaseous oxygen is introduced at the top of the SuperOxygenation cone.

The custom design ensures there is enough inlet velocity to break up the injected gaseous oxygen and prevent coalescence. This velocity ensures the gaseous oxygen is unable to rise out of the top of the cone and also ensures significant interfacial gas/water surface area to provide for efficient dissolution. As the cone widens at the bottom, the water velocity slows to a point that is slower than the buoyant velocity of the gaseous oxygen bubbles. These parameters serve to trap the bubbles inside of the cone until they are completely dissolved - they can't get out the top due to the high inlet velocity and they can't get out the bottom due to the low discharge velocity. The oxygenated wastewater is then reintroduced to the force main to be mixed with the flow.

The project was designed with three main objectives: To ensure and maintain a positive DO level in the plant influent, to reduce the wet well odors at the Allisonville Lift Station, and to reduce the corrosion problems created by the presence of hydrogen sulfides within force mains. The ECO2 units have been in place for 6 years and have achieved each of these goals, meeting the Town of Fishers' expectations.

Several ECO2 installations are operating throughout the United States, as well as in Canada. The systems are designed and produced by Eco OxyGen Technologies, LLC, headquartered in Indianapolis, IN. For more information please visit the company's website at www.eco2tech.com.

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