BlueInGreen®
solutions for water quality

Technology

SDOX-CS ®

Application

Collection System Odor and Corrosion Control

Location

Turtle Creek Interceptor
Rogers, AR

Project Goals

Reduce collection system odor and corrosion by minimizing H_2S production.

Demonstrate oxygen injection technology in gravity sewer applications.

Determine design criteria for full-scale implementation, including OUR and sulfide requirements.

overview

Sustainably Eliminating Collection System Odors with Oxygen

In summer of 2012, The City of Rogers, Arkansas and BlueInGreen partnered to study the effects of dissolved oxygen on hydrogen sulfide reduction within the city's sewer collection system. The study focused on a particular stretch of the gravity interceptor which runs along an area known as Turtle Creek. The primary objective was to demonstrate the reduction of hydrogen sulfide through oxygenation – specifically, utilizing the BlueInGreen SDOX-CS technology to inject oxygen via a sidestream process within the gravity system.

Hydrogen sulfide, H_2S, is a toxic substance that acts as a respiratory depressant in both humans and wildlife, and is probably the most difficult compound plaguing wastewater collection systems today. Hydrogen sulfide gas forms within a collection system as a result of bacterial action on organic matter under anaerobic conditions. The formation of hydrogen sulfide raises two primary concerns for those charged with maintaining a city's or industry's collection system: nuisance complaints from odor emissions as well as corrosion to steel and concrete structures. Millions of dollars are spent annually to address odor issues and correct long-term corrosion damage to structures within collection systems.

Reduction of hydrogen sulfide is most efficiently accomplished by delivering dissolved oxygen into the collection system itself and promoting aerobic conditions that prevent the formation of hydrogen sulfide gas. BlueInGreen designed and operated the SDOX-CS unit to deliver sufficient quantities of dissolved oxygen within the sidestream process to promote aerobic activity and minimize the formation of hydrogen sulfide. The two key design parameters for these types of systems are oxygen uptake rate (OUR) and oxygen requirements for sulfide oxidation. As outlined by EPA and confirmed in this study, typical values for OUR range from 10 to 15 milligrams of dissolved oxygen per liter per hour of retention time. Furthermore, the requirements for sulfide oxidation range from 2 to 5 pounds of dissolved oxygen per pound of dissolved sulfide, depending on wastewater characteristics.

At Turtle Creek, the SDOX-CS was set up to deliver oxygen at a point downstream from a baseline sample manhole (2-3) and upstream from three (3) sample manholes (2-1, 1-8, 1-3). Figure 1 shows the DO levels immediately upstream (2-3) and downstream (2-1) of oxygen injection as well as DO, ORP, and H_2S further downstream (1-8, 1-3). The data illustrates the effectiveness of SDOX-CS technology at promoting aerobic conditions in collection systems for the purposes of odor and corrosion control. The variation in DO levels seen at manhole 2-1 was controlled by manual adjustment of SDOX-CS operations to demonstrate downstream effects of oxygenation.

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Figure 1: Control of Hydrogen Sulfide Gas in a Gravity Sewer, Oxygenation via SDOX-CS®