

**Knoxville Utilities Board
Knoxville, Tennessee**

Forks on the River Pump Station

Design Performance: <5 ppm H₂S in gas phase

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Project Description

In 2004, the Knoxville Utilities Board (KUB) initiated the innovative PACE 10 (Partners Acting for a Cleaner Environment) program to accelerate wastewater system improvements. PACE 10 is a fast paced 10-year program to eliminate sewer overflows, meet Clean Water Act requirements and comply with federal regulations. To date, the KUB has improved over 23 miles of pipelines and completed major work on storage tanks and the collection system.

The KUB received numerous odor complaints each year from the area surrounding their Water Treatment Plant and a local day care facility. The Hydrogen Sulfide smells originated at the Forks in the River Pump Station and the corrosive gasses were negatively impacting the integrity of force main piping and equipment. In keeping with the PACE 10 program objectives, the KUB decided to combine the problem of stopping odor complaints with improving the longevity of existing and new collection system infrastructure.

The Board considered all available alternatives for controlling the H₂S odor, including chemical addition, scrubber installation and use of Bioxide. The KUB has a long history of making environmental responsibility a priority, so they also reviewed the environmentally-friendly **ECO₂ SuperOxygenation System**. They ultimately selected the **ECO₂ SuperOxygenation System** as a cost-effective, non-chemical solution to prevent the formation of Hydrogen Sulfide and solve their odor and corrosion problem at the same time.

With a goal of reducing Hydrogen Sulfide to an average of <5 ppm, **ECO₂** custom-designed and installed their proprietary Speece Cones with oxygen injection, metering and monitoring systems. The project began in 2007, with completion in early 2008. H₂S levels that previously spiked up over 1,000 ppm have been reduced to an average of <1 ppm with the installation of the **ECO₂ SuperOxygenation System**.

Force Main Odor Control and Corrosion Prevention



The **ECO₂ SuperOxygenation** technology is an innovative, economical and environmentally-friendly solution for municipal wastewater systems including Force Main, Headworks and Primary Odor Control. Because the formation of Hydrogen Sulfide is prevented rather than just controlled, the **ECO₂ SuperOxygenation System** also prevents corrosion of collection system and treatment plant piping and equipment.

The **ECO₂** technology is not your typical oxygen application. The **ECO₂** system dissolves pure oxygen in wastewater at oxygen transfer rates of well over 90%, rates not seen in previous applications.

We've helped communities from coast to coast with their odor and corrosion problems. Visit our website at www.eco2tech.com to read more about our technology and our successes, or contact Inken Mello at 858.272.7102, imello@eco2tech.com



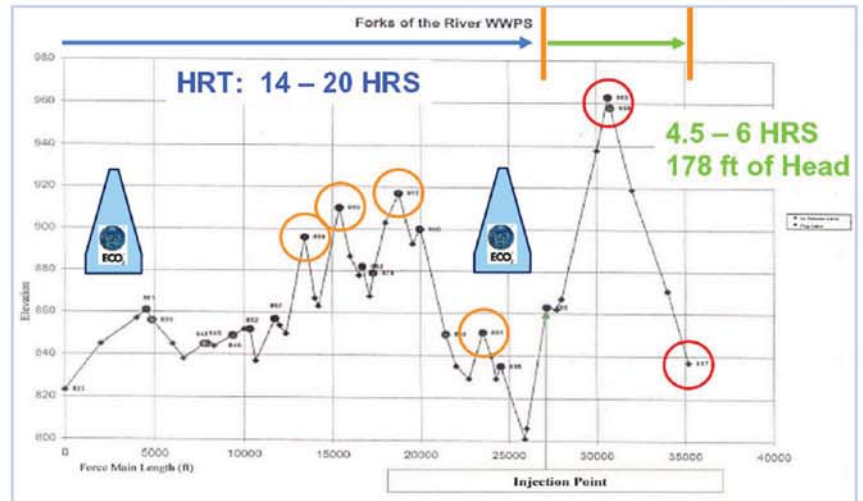
Project Description

The Knoxville Utilities Board provides energy and water utilities to over 67,000 customers with four wastewater treatment plants and 61 pump stations in the 248 square mile area served. Odors emanating from the Forks in the River Pump Station and force main resulted in continuous complaints in the surrounding area. The KUB decided to prevent H₂S from forming, thus preventing odors and corrosion by installing an **ECO₂ SuperOxygenation System**.

The Forks in the River Pump Station pumps a combination of industrial and residential wastewater approximately 6.4 miles to the treatment facility. Monitoring indicated that industrial discharges to the system were extremely high, with BOD spikes of over 600 mg/l.

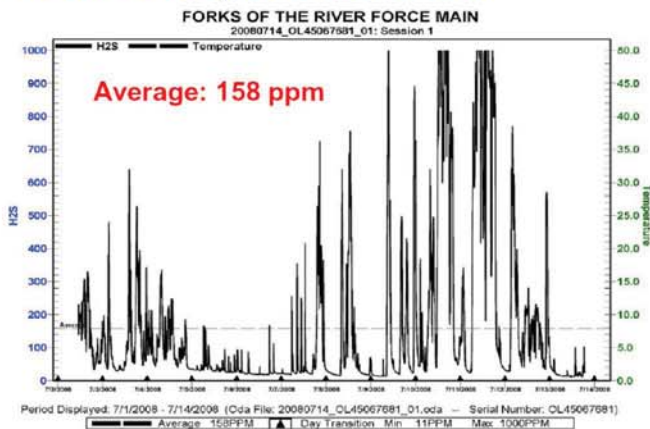
During Phase 1 of the project, an **ECO₂** System was installed at the midpoint of the force main and was successful in reducing H₂S to an average of 6 ppm. Phase 2 included installation of a second **ECO₂** System at the beginning of the Forks in the River force main. After installation and start up of the **ECO₂** System, H₂S was successfully reduced to <1 ppm. (See *OdaLogs below.*)

The **ECO₂ SuperOxygenation Systems** have resulted in elimination of odor complaints and the protection of the Knoxville Utilities Board's investment in the Forks in the River section of its collection system.

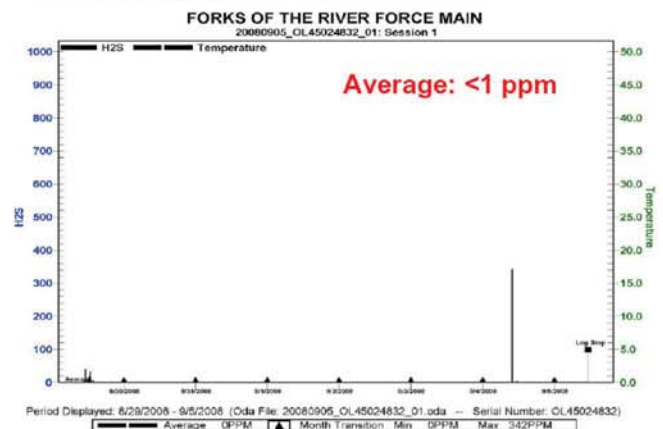


Profile of the Forks in the River force main showing locations of the two **ECO₂ SuperOxygenation Systems**.

Before **ECO₂** System Installation



After **ECO₂** System Installation



TECHNICAL SPECIFICATIONS

ECO₂ System Design Cone at Pump Station

Cone diameter	3 ft.
Cone height	12 ft.
Oxygen dissolution rate	1,000 lb./day

ECO₂ System Design Cone at FM Midpoint

Cone diameter	3 ft.
Cone height	12 ft.
Oxygen dissolution rate	650 lb./day

