CASE STUDY

# PHILADELPHIA WATER TRENCHLESS SEWER REHABILITATION

**Originally specified and awarded as styrene-free, the Contractor secured the project with proof of EnviroCure's styrene mitigation and encapsulation for problematic sewer and stormwater drainage areas in various locations throughout densely populated Philadelphia, PA.**

## THE CHALLENGE

The Philadelphia Water Department was experiencing problematic sewer and stormwater drainage areas throughout the city. The aging sewer system consists predominantly of elliptically shaped brick combined sewer pipes and manholes. Vitrified clay pipe and reinforced concrete pipe areas are also prevalent in smaller diameters.

Repair was needed in previously identified areas where roads were flooding, pavement was settling, and where dye tests had revealed infiltration and inflow. All of these issues were included in an annual service contract for trenchless sewer rehabilitation. Without these repairs, there would be an increased likelihood of combined sewer overflows.

The bid consisted of nearly every method of sewer rehabilitation in which the Contractor specializes: CIPP, spin-cast lining of sewers and manholes, mainline grouting, and point repairs. Open-cut pipe replacement and doghouse manhole installations were subcontracted. The contract called for approximately 50,000 LF of sewer rehabilitation, or the full budgeted contract amount, to be completed within one year.

In addition, due to Philadelphia being densely populated with multiple sized piping throughout the infrastructure, it was critical that the liners could adapt to multiple pipe sizes. In some cases, the sewers were 60-inch circular brick sewers, which is very deep and requires a large liner.

The one aspect of this project that differed from past contracts was the requirement of styrene-free or "green" resin for all liners to be installed, city-wide, due to odor concerns from previous contracts that utilized standard polyester resin with styrene.

When rehabilitating pipes using a styrene-based polyester resin system, during the installation and curing process, small concentrations of residual styrene monomer can be emitting and detected at the jobsite. These emissions can sometimes be detected within connections to the host pipe. After the tube is cured, the styrene eventually dissipates to a non-detectable concentration, so styrene exposure is short-term. Breathing elevated

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## PROJECT SNAPSHOT

**PROJECT**
Annual Service Contract for Trenchless Sewer Rehabilitation

**CUSTOMER**
Philadelphia Water Department

**OBJECTIVE**
Repair aging sewer system that consists predominantly of elliptically shaped brick combined sewer pipes and manholes.

## UNITED FELTS PRODUCTS USED

EnviroCure®
Patent Pending

concentrations of styrene can create respiratory issues, and irritation of the eyes, nose, and lungs, but the main complaint during trenchless rehabilitation is an unusual, plastic odor.

"Green" resin presented challenges from myriad phases within the project lifecycle: market price volatility, supply chain availability, and challenges from an installation and curing standpoint.

After originally specifying a styrene-free solution and being awarded the job due to the lowest cost, the Contractor proposed a new product, EnviroCure® from Applied Felts (now United Felts) which features a "styrene barrier" liner tube that has a nylon coating designed to minimize styrene odors. The owner agreed to pilot the product in five locations and soon agreed to the substitution as an "equal" to the originally specified material in the contract.

Manufactured by United Felts, EnviroCure is a styrene impermeable polymer coating applied to traditional CIPP liners that mitigates and encapsulates styrene emissions and odor. The proprietary all-felt or hybrid felt/glass liners coated with a styrene barrier vastly reduces, if not eliminates, styrene odors and emissions on the jobsite before, during, and after installation—removing the significant cost and unpredictability of styrene-free resin systems.

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# IMPACT

1

Philadelphia Water was so pleased with the performance of EnviroCure's ability to mitigate the styrene emissions, all future bids have specified a "styrene barrier" rather than "styrene-free" resins.

2

The proposed repair method both met and exceeded the project objectives, as the owner noted a significant decrease in odor complaints from its customer base.

3

The Contractor has been able to provide a consistent presence in the city to tackle its massive infrastructure rehabilitation needs.


### ANATOMY OF ENVIROCURE FELT LINER

Features multiple layers of material, which are overlapped to reduce styrene odor and emissions. This multi-layer construction consists of:

1. **Inner Felt Layer - With Styrene Barrier Coating**
2. **Felt Liner Layers - Resin Saturated**
3. **Pre-Liner - Optional**

## THE SOLUTION

Because of the potential health hazards due to working with styrene, the Contractor offered some extra precautions to convince Philadelphia Water to use EnviroCure® liners to provide styrene mitigation and encapsulation, preventing a dangerous level of styrene from emitting into the environment.

1. The client was educated on the proprietary EnviroCure barrier, which encapsulates and mitigates styrene emissions and virtually eliminates the styrene once cured.
2. Samples were taken and tested to ensure styrene levels were well below EPA standards.
3. Because styrene emissions tend to be most abundant when opening the refrigerated truck, a clean truck was used to prevent the potential of any residual styrene being released. No styrene product had ever been stored in that truck.
4. The client visited a working jobsite in which EnviroCure liners were being used. This provided observable proof of the minimal effects and minimal odors of styrene when using EnviroCure liners.
5. The price was an issue, so it was an advantage that EnviroCure was significantly less expensive. However, due to the longstanding relationship and Philadelphia Water's willingness to try the relatively new product, an additional discount was provided to ensure the client's confidence in the styrene mitigation provided by EnviroCure.

## THE RESULTS

The project is ongoing and has been extended through 2024.

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