

## General Questions

### Why was the study conducted?

The 2018 study published in *Journal of the American Water Works Association* was conducted to help state transportation agencies in the U.S. better select and oversee cured-in-place-pipe (CIPP) technology for the repair of storm sewer culverts. The study objectives were to: (1) compile and review CIPP-related surface water contamination incidents from publicly reported data; (2) analyze CIPP water quality impacts; (3) evaluate current construction practices for CIPP installations as reported by state transportation agencies in the United States; and (4) review current standards, textbooks, and guideline documents.

### Where can I obtain the files for this study?

The study is available on the *Journal of the American Water Works Association* website [<https://onlinelibrary.wiley.com/doi/full/10.1002/awwa.1042>] and downloadable as a PDF file.

### What is CIPP?

Today, the cured-in-place-pipe or CIPP process is used to sanitize sewer, storm sewer, and drinking water pipes. The CIPP process is also used to repair pipes outside the U.S. The CIPP process involves the chemical manufacture of a new plastic pipe inside an existing damaged pipe. The process involves the handling of raw chemicals onsite. If the damaged pipe is not repaired, it may fail and will ultimately need to be replaced. An advantage of the CIPP technology is that a new plastic pipe is created without the need for digging up the damaged pipe. CIPP repairs can be less expensive compared to other alternatives. The CIPP process was invented in the 1970s.

### Who funded this study?

This new study is part of a [project](#) funded by six state transportation agencies. The lead state agency was the Virginia Department of Transportation (VDOT), followed by the California Department of Transportation (CALTRANS), Kansas Department of Transportation (KDOT), North Carolina Department of Transportation (NCDOT), New York Department of Transportation (NYSDOT), and Ohio Department of Transportation (ODOT). The transportation agencies funded the project because they desired to better understand chemical emission from CIPP storm water culvert repairs.

### Who was involved?

The study was carried-out by Purdue University professors and graduate students. Team members included civil, environmental, and materials engineers. The team received feedback from 32 state transportation agencies, among other organizations. States that provided information included Alabama, California, Colorado, Delaware, Florida, Iowa, Idaho, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maine, Michigan, Minnesota, Montana, North Carolina, New Mexico, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Utah, Virginia, Vermont, Washington, Wisconsin, and Wyoming. As part of the study, one professor attended a popular CIPP Construction Inspector training course in 2017.

### How do I donate to help the Purdue team continue their CIPP research?

This research was not supported by public donations. Though, the researchers continue their work on helping the public better understand chemical exposures. If you would like to donate to that effort please go to <http://Giving.Purdue.edu/WaterPipeSafety>. Funds would be used for supporting future testing to publicly distribute results, and other activities.

## **Was the study reviewed by experts in the field before publication?**

Yes. Before publication, the study (or manuscript) was subjected to peer-review by the *Journal of the American Water Works Association*. First, the manuscript was submitted to the journal for consideration. There was no guarantee that the manuscript would be published by the journal. Next, the manuscript was reviewed by experts in the field chosen by the journal who looked at the study's originality and scientific importance of the topic, the quality of the work performed, and the appropriateness for the journal. Based on their recommendations and the consideration of the journal Editor, the manuscript was accepted for publication. Publication of this study was not guaranteed, and the Purdue researchers do not know who the persons were that provided feedback. This anonymity is common and important so that the experts can provide honest feedback. Questions about the peer-review process should be directed to the *Journal of the American Water Works Association*.

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## **Recommendations**

### **Do you have any recommendations on how to use CIPP and minimize environmental impacts?**

Yes. The recommendations are described in the study "RESULTS AND DISCUSSION" section. Recommendations are primarily designed for organizations that evaluate, select, and oversee CIPP technology use for repairing storm sewer infrastructure. Agencies responsible for clean water act administration in each state and territories, and who respond to chemical incidents would also benefit from the study's recommendations. Health officials can also better understand the types of materials used, created, and emitted during CIPP installation so they can better design air monitoring, occupational and public health investigations. CIPP contractors should adjust their operations based on these results to improve process safety and minimize environmental impacts.

### **I have been told that discharging waste into streams and ditches is okay. Recently, I heard that I should talk with local authorities about CIPP waste discharge. What should I do?**

Discharge of waste to the environment is typically regulated under the federal Clean Water Act. Past studies have shown CIPP generated waste can be acutely toxic to aquatic organisms (dissolving them at room temperature in some cases). You should not discharge any waste to the environment unless you have permission from the state or territory's regulatory authority. Often this is the state environmental management or protection agency. "Local authorities" do not often issue waste discharge permits, and state agencies are not "local."

### **Do you have a list of requirements I can insert into my specification?**

Please contact the pooled fund [Lead Agency Contact](#).

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## **Questions about Worker, Public Safety and Environmental Protection**

## **Have there been incidents where chemicals released by CIPP installation processes have caused water contamination?**

Yes. The new study identifies 13 unique incidents, some of which resulted in large-scale water contamination, fish kills, and reports of illness. Some incidents touched off multi-state agency responses because downstream drinking water supplies became chemically contaminated due to the CIPP storm sewer installation. A review of available sanctioned field studies also found chemical contamination occurred in every study. In one study the waste generated during steam-CIPP installation dissolved aquatic organisms at room temperature within 24 hours. The toxicity of that waste was not due to styrene either when diluted with water. The use of CIPP technology has contaminated surface water and water supplies. The incidents described here may be outlier events, or they may represent the risks inherent of typical installations.

## **Can your new study be used to improve workers and public safety?**

While this study was not designed to focus on worker and public safety, the results do have value to persons who are seeking to improve the safety of CIPP workers and the public. Since [little is known about what chemicals can be released from CIPP installations](#), this new study helps bring together information from multiple sources. Persons who want to conduct air monitoring can use this information to help select the chemicals they could test for.

## **What levels of styrene in water have been associated with CIPP?**

Styrene is only one of many chemicals used for some CIPP installations. In New York, a study showed styrene in wastewater at 250 mg/L. A study in Alabama found 143 mg/L in creek water downstream of a CIPP storm sewer installation. Styrene was reported at a level greater than 5,000 mg/L in creek water following one CIPP installation. Styrene has been detected at other chemical spills and CIPP installations.

## **Why do you keep telling us not to only focus on styrene?**

A variety of chemicals have been and can be released from CIPP installation sites. Some of these “other” chemicals have exceeded aquatic toxicity thresholds. These “other” chemicals include carcinogens, endocrine disrupting compounds, hazardous air pollutants, and those with little toxicity data. Trimethylbenzenes, acetone, phthalates, and other compounds that can be toxic to fish have commonly been associated with CIPP water contamination. Several chemicals that have state water quality standards have been associated with CIPP installations.

## **How long will CIPPs leach chemicals into the environment?**

Few studies were found that described chemical emissions or water quality impacts associated with CIPP installations. Data found indicated that chemical contamination can remain for up to 4 months. Because very few studies have been conducted, it is difficult to make generalizations regarding the magnitude and duration of chemical leaching. Additional work is needed to understand how different installation practices, resins, etc. influence chemical leaching. This, along with other recommendations, were outlined in the new study.

Additional questions? Contact us at [CIPPsafety@purdue.edu](mailto:CIPPsafety@purdue.edu).