

<https://www.researchgate.net/publication/245563169> Environmental Implications of Cured-in-Place Pipe Rehabilitation Technology

Cured-in-place pipe (CIPP) technology is commonly used for pipe rehabilitation, and transportation agencies are increasingly using it to repair damaged pipe culverts. In typical CIPP applications, a lining tube saturated with a styrene-based thermosetting resin is installed into the damaged pipe. Subsequent curing with a heat source results in a pipe within a pipe. In this study, seven styrene-based, steam-cured CIPP installations in surface water and storm water conveyances in Virginia were identified and observed over the course of 1 year. Although the sites were not directly linked to sources of drinking water, styrene levels at five sites were higher than the Environmental Protection Agency's maximum contaminant level for drinking water of 0.1 mg/L. These concentrations were detected at these sites for a minimum of 5 days to 71 days after installation. Certain measurements were also found to exceed the concentration required to kill 50% of several freshwater aquatic indicator species. The findings suggest that the elevated styrene levels could have resulted from one or a combination of the following: (a) installation practices that did not capture condensate containing styrene, (b) uncured resin that escaped from the liner during installation, (c) insufficient curing of the resin, and (d) some degree of permeability in the lining material. In response to the preliminary findings of this study, the Virginia Department of Transportation suspended the use of styrene CIPP for conveying surface or storm water while the department further evaluated CIPP repair and subsequently developed new requirements for these installations.