



SOUTH PLATTE  
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# CIPP and your Treatment Plant



- What is CIPP?
- Project History
- Concerns with CIPP
- Permitting Process
- Unknowns



Before



After

# What is CIPP?

- Cure-in-place Pipe
- “Pipe within a Pipe”
- Used across the country for wastewater, stormwater, and some drinking water applications.
- Process is to insert a felt liner into the pipe that has been saturated with an epoxy, usually styrene based. The pipe is then inflated with hot water, steam, or air pressure and then cured one of 3 ways:
  - Hot water- 180- 190 °F
  - Steam
  - UV Light





# Oxford Stormwater Project

- City of Englewood project
  - Reduce flooding impacts and sinkhole issues along Oxford Ave.
- 2,740 ft of 78"-92" pipe
  - Divided into at least 3 segments
  - 832,000 gallons of water to fill
  - More than 2.5 million gallons of water total for the project discharge (3x the pipe volume)
- Filled with tap water from a hydrant and discharged to nearby manholes.

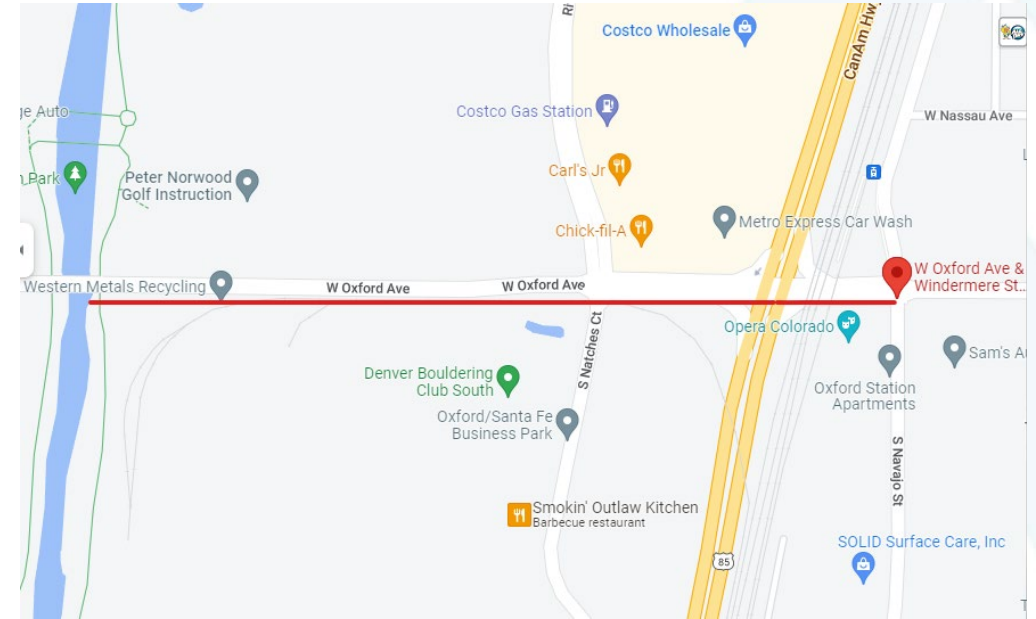


Table 2. Heavy Metals Found in CIPP Condensate and Stormwater 7 Days after Material Installation

sample description	metal concentration, ppm <sup>1</sup>									
	Al	Ba	Ca	Cu	Fe	Mg	Pb	Si	Zn	
CIPP condensate	0.24	0.008	4.94	0.03	0.06	0.04	0.002	4.80	1.20	
CIPP Site 1 (7 days after installation)	inlet	0.22	0.021	23.4	<0.02	0.44	0.07	<0.001	3.50	<0.03
	outlet	0.10	0.025	29.6	<0.02	0.31	0.08	<0.001	3.37	<0.03
	downstream	0.11	0.024	30.5	<0.02	0.32	0.08	<0.001	3.54	0.09
CIPP Site 2 (immediately after installation)	inlet	0.37	0.017	12.5	<0.02	2.76	0.20	<0.001	2.70	<0.03
	outlet	1.01	0.049	63.8	<0.02	1.09	0.34	0.005	13.4	0.44
	downstream	<0.01	0.034	42.7	<0.02	0.17	0.21	<0.001	8.23	<0.03

documented nearby odor complaints and fish kills downstream. Several DOTs also required the use of impermeable matting to limit waste discharge, a cured CIPP rinse and rinsewater capture, and third party stormwater styrene testing for pre- and postinstallation upstream and downstream.

DOTs knew little about the ultimate disposal location of collected waste. Several wastewater utilities in New York would not accept CIPP wastewater because of its unknown toxicity,<sup>40</sup> and one utility required granular activated carbon treatment before CIPP process water was discharged to its sanitary sewer.<sup>41</sup> All DOTs solely focused on styrene release into waterways and had not tested for any other contaminants.

**Condensate Chemical Characteristics and Toxicity.** CIPP condensate, the viscous liquid waste product generated by the CIPP curing process, was characterized to understand

temperature. Thus, results imply that the condensate was a mixture of several solvents.

Another important finding is that the 100% of *D. magna* organisms were killed within 48 h when styrene levels were more than an order of magnitude below the styrene LC50 in the 1:10 000 diluted solution at room temperature. The styrene LC50 for *D. magna* is 23 ppm for a 48 h exposure period<sup>24,25</sup> and the styrene concentration present in the daphnid water was 1.53 ppm. This finding is important, as it underscores that condensate toxicity was not simply caused by styrene. Condensate was a complex mixture of compounds. Additional work is needed to characterize CIPP condensate composition, contaminant, persistence, and chemical toxicity especially at water temperatures indicative of the environment. Increased water temperature has been shown to have no effect or increase

- Temperature of cure water when released
- VOC contaminants in process wastewater from the epoxy, particularly styrene.
- Atmospheric hazards from Styrene and other VOC's, including odor complaints



## Other Concerns with this project

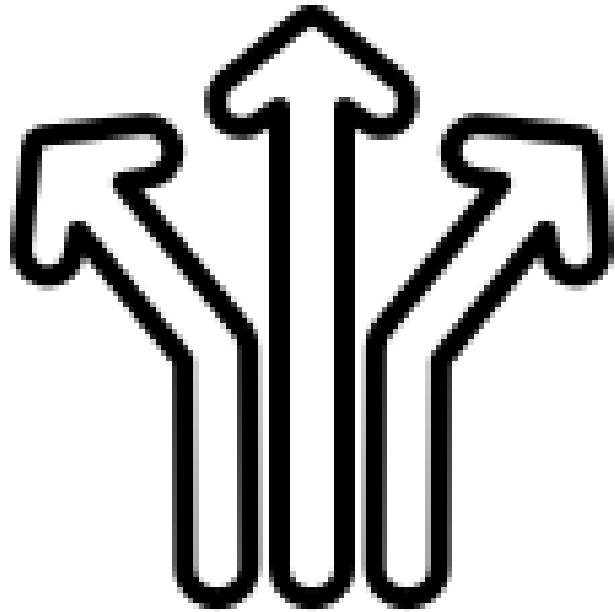


Projected hydrants for use fall into 3 separate sanitation districts/cities

Some water for an Englewood project will come through a Littleton City Line

Flows/permissions for collection system capacity

Definition of Construction Water vs. Process Water



# Path Forward

# Permitting Process



Mass Based Discharge  
Limitations/ Flow  
Limitations



General Wastewater  
Control Permit/  
Enforcement Capabilities



Other Constraints





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# Into the Unknown

## Project Specific

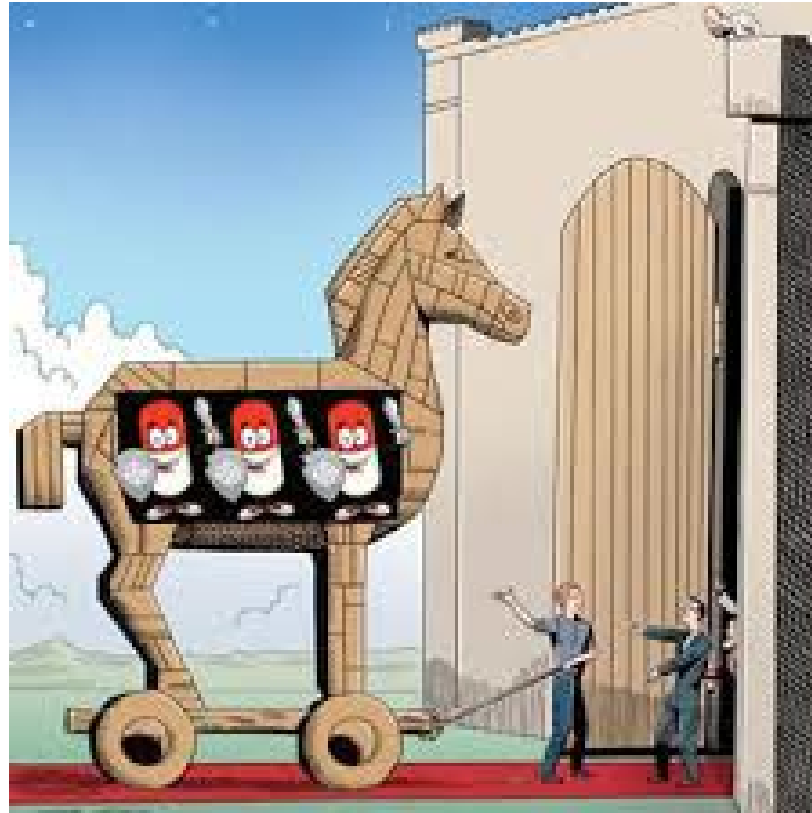
- Treatment system still undefined
- General Contractor not selected
- How much water at a time will be discharged
- Final Chemicals/products have not been selected

## General

- Are CIPP projects the cause of several upsets at the treatment plant over the last several years?
- Are the limits we set low enough? Too low?
- Is a permit the best way to handle this? What about the other projects happening in our district.

# Food for Thought

What else is out there that we don't know about?





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# References

- Associates, C. T. C. (2012). (tech.). Environmental Effects of Cured-in-Place Pipe Repairs (pp. 1–155). N/A, N/A: Caltrans Division of Research and Innovation.
- Kaushal, V., Najafi, M., Sattler, M., & Schug, K. (2019). Review of literature on chemical emissions and worker exposures associated with cured-in-place pipe (CIPP) installation. *Pipelines 2019*. <https://doi.org/10.1061/9780784482506.059>
- NASSCO Pipe Rehab Committee. (2017). (rep.). *GUIDELINE FOR THE SAFE USE AND HANDLING OF STYRENE BASED RESINS IN CURED-IN-PLACE PIPE (CIPP)*. National Association of Sewer Service Companies. Retrieved February 17, 2022, from <http://www.tompsc.com/DocumentCenter/View/28441/Styrene-Guideline-04Jan2018?bidId=>.
- NASSCO Pipe Rehab Committee (2020). (rep.). *Guideline for the Safe Use and Handling of Styrene-Based Resins in Cured-in-Place Pipe* National Association of Sewer Service Companies. Retrieved February 28, 2022, from [https://www.nassco.org/wp-content/uploads/2021/02/Safe-Handling-and-Use-of-Styrene\\_Specification-Guideline-\\_2020-2.pdf](https://www.nassco.org/wp-content/uploads/2021/02/Safe-Handling-and-Use-of-Styrene_Specification-Guideline-_2020-2.pdf).
- Ra, K., Teimouri Sendesi, S. M., Howarter, J. A., Jafvert, C. T., Donaldson, B. M., & Whelton, A. J. (2018). Critical review: Surface water and stormwater quality impacts of cured-in-place pipe repairs. *Journal - American Water Works Association*, 110(5), 15–32. <https://doi.org/10.1002/awwa.1042>
- Tabor, M. L., Newman, D., & Whelton, A. J. (2014). Stormwater chemical contamination caused by cured-in-place pipe (CIPP) infrastructure rehabilitation activities. *Environmental Science & Technology*, 48(18), 10938–10947. <https://doi.org/10.1021/es5018637>
- Undark Magazine. (2021, March 24). *Cured in Place? An Underground Pipe Repair Raises Questions*. Retrieved March 8, 2022, from <https://undark.org/2019/04/22/cured-in-place-plastic-pipes-cipp/>
- Whelton, A. J., Ra, K., Teimouri Sendesi, S. M., Nuruddin, M., Li, X., Howarter, J. A., Youngblood, J. P., Jafvert, C. T., & Zyaykina, N. N. (2019). Contaminant release from Storm Water Culvert Rehabilitation Technologies: Understanding Implications to the environment and long-term material integrity. <https://doi.org/10.5703/1288284317089>

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**Questions?**

