



CYPRESS

In-Line Inspection



Hetch Hetchy
Regional Water System

Steel Mortar-lined Pipeline Condition Assessment of 56 miles of 78" municipal water pipeline

Challenge:

- Assess and locate anomalies with the potential to reduce operating pressures within asset lifecycle criteria
- Complete geometry and pipe wall assessment in short outage window of 45 days so that pipeline could be returned to service.

Solution:

- Utilize the 78" EcoVision™ XHR Geometry and MFL In-Line Inspection ("ILI") tool system capable of detecting anomalies in the pipe wall

Result:

- Successful in-line inspection of Hetch Hetchy's San Joaquin Pipeline No. 3 for a total of 56.5 miles and the accurate location of anomalies

Comprehensive Pipeline Integrity Management Project- Extra-High Resolution ("XHR") Magnetic Flux Leakage ("MFL") Inspection of City of San Francisco Public Utility ("SFPUC") Hetch Hetchy Water and Power ("HHWP") SJPL #3

Background

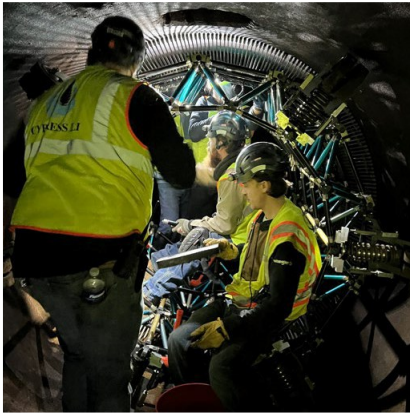
Cypress In-Line Inspection, LLC ("Cypress") and its predecessors have been supporting SFPUC HH for over eighteen years. Hetch Hetchy has an active and on going pipeline assessment program. Hetch Hetchy has four pipelines which cross the San Joaquin Valley, which is located to the east of San Francisco. The Hetch Hetchy pipelines deliver approximately 219.9 MGD of water to about 2.7 million people. Because they have to deliver water constantly and consistently, Hetch Hetchy's goal is to maximize its assets' useful life and to lower costs associated with maintenance of their assets. Hetch Hetchy understands the importance of keeping the pipelines operating. The costs, as well as the negative publicity, associated with a planned shut down of one line are less than those costs associated with an unplanned outage of all lines should one line fail.

With this goal in mind, in 2007 Hetch Hetchy began searching for a technology that would assess the condition of the pipelines. Hetch Hetchy personnel learned no technology existed that could inspect their lines due to the mortar lining. Hetch Hetchy was introduced to Electromechanical Technologies, Inc. (ETI), the predecessor to Cypress In-line Inspection, in 2007. After consulting with the founder of the company, a pilot program was proposed to determine if Magnetic Flux Leakage (MFL) technology could be adapted to inspect a pipeline with a mortar lining. The pilot program proved that MFL technology could successfully be used in a pipeline with a mortar lining. With this proof, Hetch Hetchy and ETI built the first generation of a large diameter MFL tool capable of inspecting the metal pipe wall through the mortar lining. In 2008 this tool was successfully used to inspect 7 miles of Hetch Hetchy's pipeline No. 1. Shortly thereafter, Hetch Hetchy and ETI developed a geometry inspection tool to look for the ovality of each line. Electric Tow Vehicles were also developed to propel the GEO and MFL tools through the lines.

The Project

The HHWP SJPL3 pipeline was built in the mid-1970's. The only condition assessment performed on the line has been visual inspection either 1) by physically entering the line, or 2) by digging up a portion of the line and identifying defects in the exposed area. HHWP would then use this data to extrapolate the condition of the line. HHWP contracted with Cypress to inspect the steel pipe- line portion of SJPL3 using both the Geometry and MFL technologies.

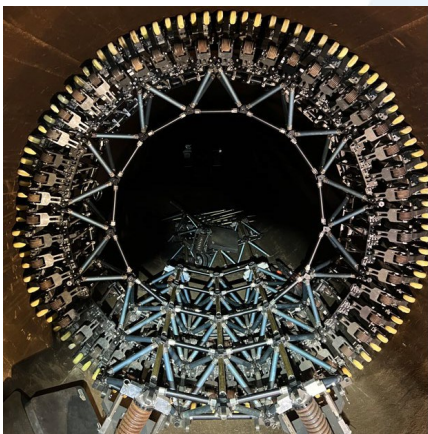




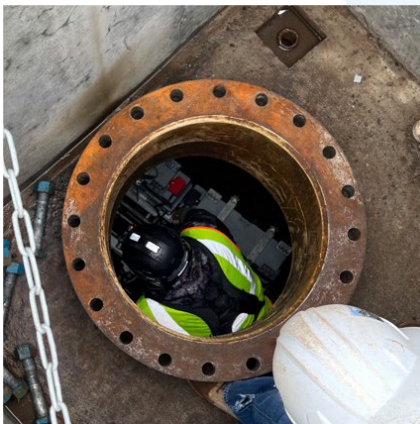
The project began with a site visit by Cypress personnel three months prior to the start of the inspection with the purpose of obtaining additional information which was not included in the "as- built" lay sheets. HHWP and Cypress visited a number of locations along the line that were not completely understood by reviewing the lay sheets. After the site visit, the Cypress personnel prepared the Geometry and MFL tools for use in the 78" pipe. The Cypress technology can be utilized to inspect pipelines ranging from 52" to 120" with its electric two vehicles. Smaller pipelines may be inspected with a tethered winching system. This Cypress technology is calibrated to the diameter of the line, the thickness of the mortar lining, and the thickness of the steel pipe wall.



Prior to the start of the inspection, Cypress shipped the tools, ETVs, and support equipment to the HHWP yard located in Oakdale, CA; this site became the staging point for the project. When Cypress personnel arrived on site, they loaded the Geometry tool for transport to the inspection's starting point. Cypress personnel in collaboration with HHWP and other contractors began assembling the Geometry tool and one ETV in the pipeline. When the Geometry tool was completed all electronics were tested to ensure they were properly functioning. Cypress then inspected the first segment of the pipeline...approximately 3 linear miles of pipeline. When the Geometry tool completed the first section it was disassembled and moved to the starting point where it was reassembled to continue the inspection process. While the Geometry tool was being disassembled and moved, another team of Cypress personnel began assembling the MFL tool at the starting point. The Geometry tool continued its inspection in front of the MFL tool to complete the inspection.



At the end of each day's inspection the ILI tool data was downloaded from the tool and sent to our data analysts. The next day, Cypress data analysts begin the process of reviewing the data and performing a Data Quality Assessment ("DQA") utilizing Cypress's **EcoView™** data analysis software. The first review of the Geometry data is performed to ensure that the MFL tool would be able to safely pass through the line without any obstructions large enough to stop the tool. Both the Geometry tool and MFL successfully completed the inspections and high quality data was obtained.



Project Conclusions

Cypress plan was to take approximately seven weeks to perform both the Geometry and the MFL inspections. As the result of excellent coordination, Cypress was able to complete the entire inspection phase two weeks early, from the original scope allowing HHWP to return the line to service on time and at a lower cost.

This successful project was the fourth inspection successfully completed for SFPUC and the HHWP system.