

Steel Mortar-lined Pipeline Condition Assessment of 56 miles of 61" municipal water pipeline

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 #2

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 31 days so that pipeline could be returned to service.

Solution:

Utilize the 61" 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. 2 for a total of 56.5 miles and the accurate location of anomalies

Background

Cypress In-Line Inspection, LLC ("Cypress") and its predecessor organizations have provided continuous support to the San Francisco Public Utilities Commission's Hetch Hetchy (SFPUC HH) operations for over eighteen years. The Hetch Hetchy system maintains an active and ongoing pipeline assessment program to ensure the reliability of its infrastructure. Four major pipelines traverse the San Joaquin Valley, east of San Francisco, delivering approximately 219.9 million gallons annually (MGA) of water to 2.7 million residents.

Given the critical nature of uninterrupted water delivery, Hetch Hetchy prioritizes asset longevity and cost-effective maintenance strategies. The organization recognizes that maintaining operational continuity is essential—not only to avoid service disruptions but also to mitigate the financial and reputational risks associated with emergency failures. In this context, a planned shutdown of a single pipeline is far less costly than the consequences of an unplanned failure affecting the entire system.

In pursuit of its asset longevity goals, Hetch Hetchy initiated a search in 2007 for a technology capable of assessing the condition of its pipelines. However, the system's mortar-lined interiors posed a significant challenge—at the time, no existing inspection technology could effectively evaluate pipelines with this configuration.

That same year, Hetch Hetchy was introduced to Electromechanical Technologies, Inc. (ETI), the predecessor of Cypress In-Line Inspection. Together, they launched a pilot program to explore whether Magnetic Flux Leakage (MFL) technology could be adapted for use in mortar-lined pipelines. The pilot proved successful, demonstrating that MFL could reliably detect anomalies through the mortar lining.

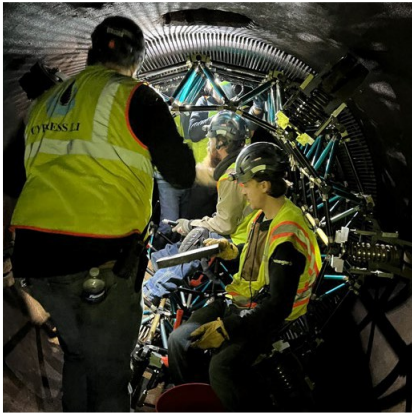
Building on this success, Hetch Hetchy and ETI developed the first generation of a large-diameter MFL tool specifically engineered to inspect the metal pipe wall beneath the mortar. In 2008, this tool was deployed to inspect 11 kilometers of Pipeline No. 1. Shortly thereafter, the team expanded its capabilities by designing a geometry inspection tool to assess pipeline ovality, along with electric towing vehicles to propel both the MFL and geometry tools through the lines.

The Project

Constructed in the mid-1950s, the HHWP SJPL2 pipeline had historically undergone only limited condition assessments. These evaluations were conducted visually—either through direct entry into the pipeline or by excavating sections to inspect exposed areas. Based on these localized observations, HHWP would extrapolate the overall condition of the line.

To advance its understanding of pipeline integrity, HHWP contracted Cypress to perform a comprehensive inspection of the steel pipe section of SJPL2 using both geometry and Magnetic Flux Leakage (MFL) technologies.





Cypress personnel prepared the inspection tools for deployment in the 61-inch diameter pipe. The company's electric tow vehicle system is capable of inspecting pipelines ranging from 52 to 120 inches in diameter. For smaller pipelines, a fixed winch system is employed. Each inspection tool is precisely calibrated to the pipeline's diameter, the thickness of the mortar lining, and the steel pipe wall—ensuring accurate data collection and reliable condition assessment.

Prior to inspection, Cypress shipped its geometry and Magnetic Flux Leakage (MFL) tools, electric tow vehicles (ETVs), and support equipment to the HHWP shipyard in Oakdale, California, which served as the project's staging area. Upon arrival, Cypress personnel transported the geometry tool to the designated inspection starting point. Working in coordination with HHWP and other contractors, the team assembled the geometry tool and one ETV within the pipeline.

Following assembly, all electronic systems were tested to verify operational readiness. Cypress then conducted the initial inspection segment, covering approximately five kilometers of pipeline. Upon completion of this section, the geometry tool was disassembled, returned to the starting point, and reassembled to continue the inspection process.

While the geometry tool was being repositioned, a separate Cypress team began assembling the MFL tool at the same starting location. The geometry tool continued to lead the inspection sequence, operating ahead of the MFL tool to ensure comprehensive coverage of the pipeline.

At the conclusion of each inspection day, data from the in-line inspection (ILI) tools was downloaded and transmitted to Cypress data analysts for review. The following morning, the analysts initiated a data quality assessment (DQA) using Cypress' proprietary **EcoView™** analysis software.

The initial review focused on geometry data to confirm that the Magnetic Flux Leakage (MFL) tool could safely traverse the pipeline without encountering obstructions that might impede its progress. Both the geometry and MFL tools successfully completed their inspections, yielding high-quality data for further analysis and reporting.

Project Conclusions

Cypress originally scheduled approximately seven weeks to complete both the geometry and Magnetic Flux Leakage (MFL) inspections. Through effective coordination and streamlined field operations, the inspection phase was completed two weeks ahead of schedule—enabling HHWP to return the pipeline to service on time and at reduced cost.

This successful effort marks the fourth inspection Cypress has completed for the SFPUC and HHWP system, reinforcing a longstanding partnership built on technical innovation and operational reliability.

Beyond California, Cypress has conducted municipal water pipeline inspections in New Jersey, Colorado, and Utah. References are available upon request.

