

Subject: **Tucson Water & Arizona Department of Water Resources (ADWR)
Leak Detection Program – 2023 Annual Monitoring Report Deliverable**

2023
Annual Report



WATER MANAGEMENT
ASSISTANCE PROGRAM



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REQUIREMENT:

Project #1

As outlined in the Tucson Water & Arizona Department of Water Resources 2022 annual report, Tucson Water contracted with Asterra Satellite Imagery company to scan the entire water infrastructure ~5,000 miles and identify Points of Interest (POI) that could potentially reflect active leaks within Tucson Water’s service area. In addition, Xylem/Pure Technologies/Water Wach’s company completed the contract with 90% of the POI’s identified and tested. The remaining POI sum is currently being tested by Tucson Water, Condition Assessment Program (CAP) employees.

Tucson Water CAP team continues to validate POI’s simultaneously with other water infrastructure. The CAP team recently added a Full Time Employee (FTE) to aide in the control of Non-revenue water loss. The CAP team accomplished approximately 100+ miles of testing on the distribution system documenting them within the asset management program Hexagon.

Leak Detection



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DELIVERABLE:

Project #2

As part of the structural integrity testing of a 15-mile long 56-year-old 42” C-303, Concrete Cylinder Pipeline (CCP), Tucson Water contracted with Xylem/Pure Technologies company to perform an internal electromagnetic test on the Avra Valley Transmission main. The 42” is a major artery into the heart of Tucson conveying approximately 30 million gallons of water per day. Although this main was recently tested acoustically by the SmartBall technology for water leakage, it was imperative a structural analysis and estimate of remaining useful life be performed. A known failure mechanism to a metallic pipeline is the degradation by corrosion. A condition assessment project will evaluate and confirm if corrosion exists and progressing anodically with a through wall corrosion pit creating the point of failure for water leakage which could soon to be catastrophic failure.

An electromagnetic test consists of the insertion of a tool into a water pipeline utilizing the flow of water to propel the tool through the conduit to a receiving location. The tool will emit an electromagnetic field by an exciter coil onto the pipe steel cylinder and pretensioned rods and the receiver will complete the circuit. The result is an analysis of steel broken rods or steel cylinder wall loss.

To date, the electromagnetic testing of the 42” transmission main is complete, and the final analysis was performed and identified a total of nine “hotspot” locations. The CAP team is in the process of creating a scope of work to perform a direct assessment of the areas for validation.

Project #3

Using technology as a tool and a data driven analysis, attaining more data was vital to the success of the project identifying the structural integrity of the 42” Avra Valley Transmission main. Tucson Water contracted with Accurate Corrosion Control, Inc. to perform an indirect



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testing method using an Interrupted-Close-Interval-Potential-Survey (ICIPS) and Pipeline Span Resistance Test. An external 10-foot interval of the complete 15 miles of pipe was chosen. Each pipe segment theoretically will be tested for effectiveness of applied Cathodic Protection, Stray Current Interference from an external foreign utility line, and electrical inline resistances. The result of the testing provided submeter GPS accuracy, pipeline “hotspot” identification and plans to correct pipeline deficiencies.



View of the Roto-cell performing a close-interval-potential-survey test.



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Project #4

Using technology as a tool for complete pipe renewal for structural integrity and a guarantee of no water loss, Tucson Water contracted with Simpson Gumpertz & Heger Inc. to provide engineering services to design the carbon fiber reinforced polymer (CFRP) liner for the 4.5-mile-long 54” Prestressed Concrete Cylinder Pipe (PCCP). This critical 54 in. diameter PCCP transmission main was installed in the 1980’s and has active deterioration of the prestressing wires. An alternative analysis was determined for CFRP to be the most suitable renewal method.

By applying a wet layup of saturated fiber impregnated with an epoxy resin at the designed layers and after the curing process, the structural integrity will be renewed 100% with a minimum 50-year life.



Pipe internal view of a CFRP installation.

SUMMARY:

To date, Tucson Water’s entire water infrastructure was scanned electronically by the Asterra Satellite Imagery technology and validated by traditional boots on the ground with acoustic ground microphone technology. The Condition Assessment Program team continues to perform leak detection on approximately 100+ miles of leak detection discrepancies and validating data through or Tucson Water Asset Management System. As previously mentioned, work order was created for each single leak and repaired. A service request was created for customer leaks for



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trackable purposes and to notify each customer in person or by a door posted informational card.

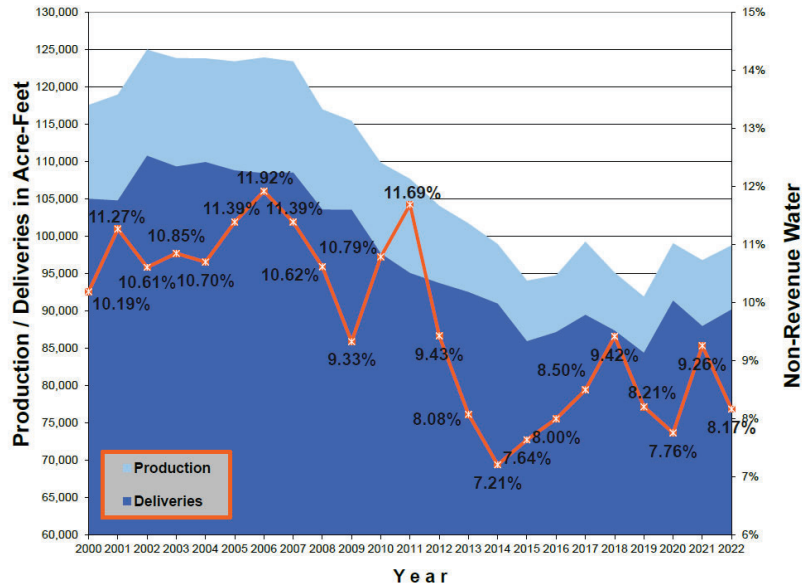
Tucson Water is proud to share the success of the annual water loss is progressing in a positive direction from a calculated 9.11% to 8.17%. Ensuring consistency with data is an active challenge. In February 2022, Tucson Water has retained the services of ME Simpson as part of expanding our non-revenue water program and continue to use technology as a tool to perform leak detection on Tucson Water infrastructure.

The completion of the leak detection program for 2023 significantly improved the data information usability for our Artificial Intelligence (AI) program. The AI program continues to be successful with our Short Main Replacement Program based off Asset Management Program documented leaks and breaks.

Attached below is a copy of the 2022 Annual Water loss report chart identifying the annual progress. As you are aware, the Tucson Water annual report was submitted previously to ADWR by traditional methods from our Water Quality Division. Tucson Water is hoping to have an updated 2023 water loss chart for the final report submittal. The information for this char is currently being compiled.



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To aide in our Tucson Water CAP team and fight to reduce the amount of water loss within our infrastructure, we will continue to utilize technology as a tool for data driven analysis by using companies with new proven methods of performing leak detection or infrastructure renewal.

Thank you for your continued support and patience as we perfect our program.

If you have any questions, please contact me at [REDACTED].

Sincerely,

Jose Pico

Jose Pico,
Tucson Water
Condition Assessment Program (CAP)

cc: John Van Winkle, P.E. Chief Engineer Rev 12/21/2023

