

Case Study

Early Warning: AQS-SYS has proven ROI after only 9 months of leak alerts

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1. Aquarius Spectrum Ltd. Ha'zoran St., 8, Netanya, Israel.
2. Hagihon - Water Utility, Jerusalem, Israel.

Categories:

- Early leak detection
- Continuous control monitoring (CCM)
- Post-maintenance monitoring (PMM)

HaGihon is the Jerusalem Area Water and Wastewater Utility. It operates as an independent corporation under the Water & Sewage Corporations Law.

HaGihon supplies water, sewage and drainage services in the Greater Jerusalem area, and servicing a million residents in the City of Jerusalem, the Town of Mevasert Zion, the Town of Abu-Gosh and the surrounding area.

The Company is responsible for development, expansion, operation and maintenance of the water, sewage and drainage networks, in accordance with the city's and town's growth and development plans. HaGihon replaces continuously aging water pipelines, expands and improves infrastructure, and constructs water storage tanks, pumping facilities, pressure reducing facilities, and more.

The Utility's water engineers estimate that of the 62 million cubic meters (50,264 Acre-foot) of water supplied per year to customers (homes and industry) in the region, approximately 2 million cubic meters (528 Million gallons) are lost due to leaks, resulting in a residual cost of approximately \$3 M. It is estimated that potential saving of water lost due to leakage can be about 50% of present leakage levels.

In 2014, HaGihon's management decided to improve customer service levels and increase the cost effectiveness of their water pipe maintenance operations by implementing a computerized monitoring system that would give early warning of hidden leaks that if not taken care of, would eventually develop into above-ground bursts. Previously, such hidden leaks couldn't be located without conducting massive survey activity.

The AQS-SYS fixed monitoring system by Aquarius-Spectrum was chosen by HaGihon due to the system's ability to monitor all pipes in HaGihon's service area, as well as the systems low rate of false-positives.

The first stage of the system implementation was completed in July 2014.

The contribution of HaGihon by, Mr. Aron Rosenberg, CTO, HaGihon

" HaGihon has a high level engineering support team that was able to guide Aquarius Spectrum analytics to identify interferences in the system and to better identify and separate leaks from other noise interferences, the cooperation of engineering team initiated addition developed and new operation methods such as a check after repair or checking the main on all its length. Before AQS-SYS, we would have assumed that our initial repair had succeeded, and wouldn't have known about the additional nearby leak. AQS-SYS provides our maintenance crews and management with automatic post-repair monitoring, thus improving standards and ensuring a good repair job. Giving us confidence that we are in control of our piping system. AQS-SYS is teaching us about how small hidden leaks develop and grow, allowing us to choose when to repair."

Aron Rosenberg, CTO, HaGihon

Facts about this case

1. 2,271,879.7 gallons of water were lost between AQS-SYS's first alert and the final repair.
2. Now, similar alerts are handled much more rapidly.

Incident Description:

Shamir Street is situated in the Gilo neighborhood of Jerusalem. It is some 700 yards in length and, below street level, a 6" steel water main pipe supplies residents with their running water.

In a matter of days after the system was installed, AQS-SYS detected a leak 22 yards from the end of the street and issued an alert accordingly. The maintenance teams sent to the area did not find the leak due to its relatively low noise level and so the utility's engineers decided to keep an eye on the sensor readings to see how it developed. At this point, 1,849.2 gallons of water were being lost per day.

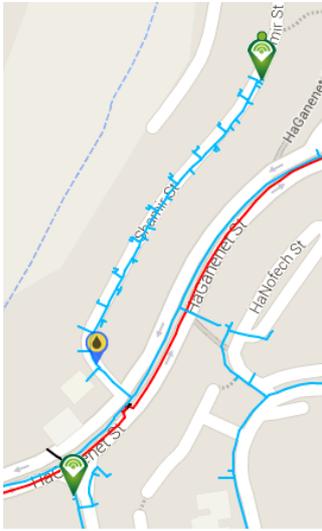
A few months passed and AQS-SYS reported a sharp increase in the leak intensity by nearly twice its original intensity and was now losing water at a rate of over 3,434.24 gallons a day.

The larger leak generated more noise and this time the maintenance team pinpointed the break and repaired it. The case was closed.

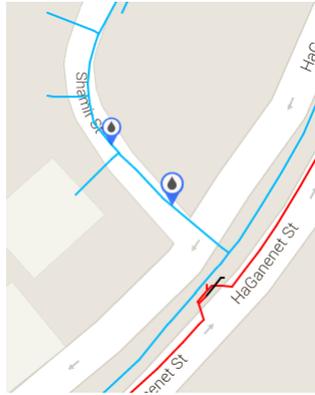
But that was not the end of the story! After the repair, the system continued to alert to the presence of a leak very close to the one just repaired. The rate of water loss had risen to 56,004.475 gallons a day. HaGihon's engineers guessed that a new hole had erupted in the pipe due to the shift of pressure after the first repair. They estimated that the second hole had been developing a little slower than the first and for that reason, the primary point of weakness was the first hole, with the second point of weakness only showing up after the first had been repaired.

"The AQS-System has prompted a quiet revolution in pipeline maintenance at HaGihon: We no longer run to fix sudden bursts, but rather use the System's early warning to plan and optimize the repair of hidden leaks. That translates to improved service, lower repair costs, and a drop in NRW"

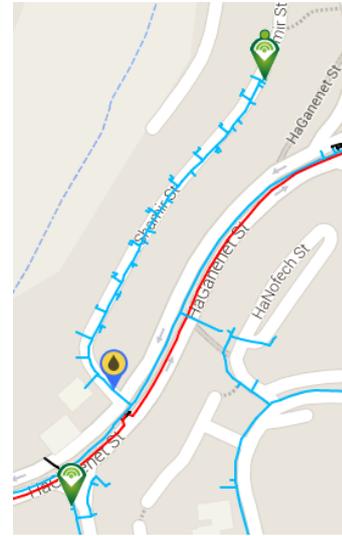
Aron Rosenberg, CTO, HaGihon



AQS-SYS Screen Showing First Leak Location in Shamir Street



Location of First and Second Leaks



AQS-SYS Screen Showing Second Leak Location in Shamir Street

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Aron Rosenberg, CTO, HaGihon

The second hole was subsequently repaired and AQS-SYS has continued monitoring the area daily, along with rest of the water distribution network. No further leakage has been noted in that location.

Case Timeline

Description

1) System Installed

3 days later...

2) Leak alert issued: High probability, **low intensity**, position: 20 yards from end of street

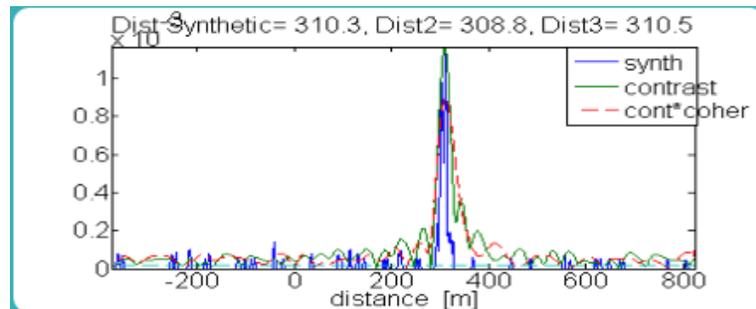
2 months later...

3) Leak is small - Maintenance team does not succeed in pinpointing leak's exact location but continues monitoring.

3 months later, leak
is under continuous
monitoring,
growing/developing
but slowly

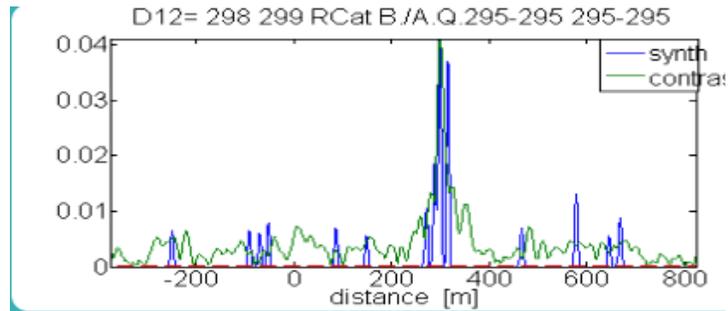
4) Leak is still small. Maintenance team still can't pinpoint the leak's exact location and continues monitoring

Correlation Graphs



Correlation Graph Showing Low Intensity Leak

4 months later, leak is growing rapidly: High probability, high intensity, position: 20 yards from end of street

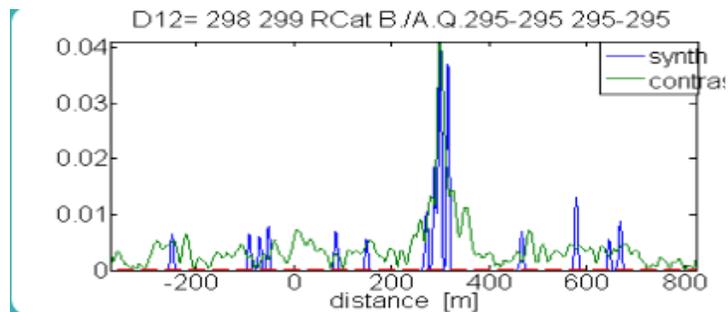


Correlation Graph Showing High Intensity Leak

- 5) Maintenance team locates and repairs the leak. Case closed

1 day later...

- 6) New Leak Alert Issued: High probability, high intensity, near previous repair position



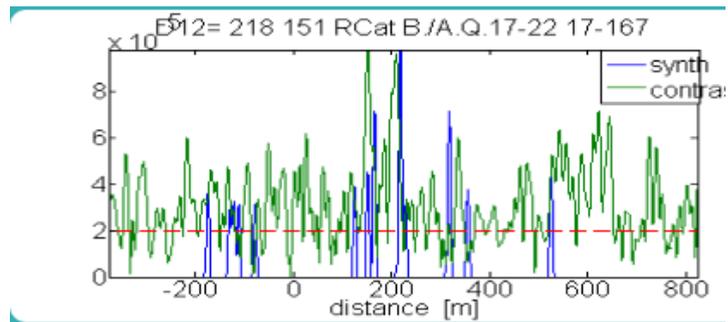
Correlation Graph Still Showing High Intensity Leak

Maintenance team concludes a new hole has erupted due to the shift of pressure in the pipes or due to the maintenance work on the previous leak.

Maintenance team
locates and repairs
the second leak.
Case closed

1 day later...

- 7) Pipe section is
under continuous
monitoring - All
quiet



Correlation Graph Showing no Apparent Leakage