

Lisbon Trial Shows Benefits of In-Pipe Monitoring

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In January 2010, EPAL commenced a pilot project to monitor water quality in Lisbon's distribution network using Intellitect Water's innovative Intellisonde™ in-pipe water quality monitors. The trial sought to assess both the technology and the benefits to be gained from continuous access to water quality data between the treatment plant and the consumer.

Developed to continuously monitor up to 12 parameters within drinking water distribution networks, the Intellisonde™ is a small water quality monitor that can be inserted into pressurised pipes. Intellisondes™ can be supplied with their own GPRS telemetry capability, but in this trial the instruments' analogue output capability was utilised to interface with an existing telemetry network.

The project enabled an evaluation of logged water quality data and tested the ability of the remote monitoring network to integrate the data into EPAL's existing network management system. This data was used by EPAL to perform diagnostics and to enable process improvements as part of a proactive approach to network management.

EPAL had previously installed and operated a network of nearly 300 Cellos (wireless dataloggers) and associated software for monitoring flow and pressure values, so it was advantageous to integrate Intellisondes™ into this network monitoring system.

Four Intellisondes™ were deployed strategically in a sub-zone and connected to Cellos. The Cellos have eight channels and the Intellisondes™ were configured to measure seven water quality parameters, with the eighth channel configured to monitor battery life.

The water quality parameters measured were Temperature, pH, Turbidity, Conductivity, Free Chlorine Residual, Free Chlorine + Mono-Chloramines, and ORP (REDOX).

The Intellisondes™ logged at 15 minute intervals with the data sent remotely via the Cellos every 24 hours, because this is the same transmission frequency operated by EPAL's flow and pressure loggers.

The data collection software was programmed to alarm any water quality events outside defined limits for Free Chlorine and Turbidity and the battery voltage programmed to monitor the battery power decay.

Initial installation of the equipment and calibration were carried out with the support of Intellitect Water. Monthly checks were carried out by the EPAL Team using portable calibration equipment to verify the accuracy of the measurements.

Planned maintenance routines were undertaken after six months to replace the Chlorine Sensors and Reference Electrodes, which had reached the end of their useful life. Initially,

Intellisonde™ battery life was less than expected but this was significantly improved by Intellitect Water during the pilot project by increasing the battery capacity and this is now a standard feature for all new installations.

The water quality data was successfully integrated into EPAL's network monitoring software (IMC). The software was capable of downloading data from all sites, initially combining any two water quality parameters with the data from the district monitoring area flow meters, which were being logged separately.

Later, the trial was further enhanced so that data could be combined for each Intellisonde™, which provided information to track water residence time within the distribution network through the use of EPANET hydraulic modelling software.



Figure 1: Example display showing Continuous Free Chlorine and Conductivity readings

The data showed that changes in Free Chlorine Residual were caused by the operation of the sub zone and provided a real benefit in understanding flows and water quality in different network operating systems. The data also showed that the sensors were very reliable, and the calibration of these measurands was simple and easy to implement.

Following extensive evaluation of multiple Intellisondes™, EPAL has formally approved the Intellisonde™ for use and their management team has recommended wide deployment in order to exploit the benefits of continuous monitoring.

Summarising the project John Howell, Operations Director at Intellitect Water, said: "We are delighted with the success of this project because it has clearly demonstrated the advantages of continuous monitoring over spot sampling during working hours. The ability to monitor water quality continuously in the distribution network helps with the early identification of water quality issues and offers the potential for improvements in operational efficiency whilst maintaining or improving tap water quality."

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