

# Unique Technology for Monitoring Piped Water

**Intellitect Water has launched a unique, highly innovative drinking water monitoring technology that will revolutionise the delivery of drinking water. The new technology monitors the quality of water in pipeline distribution networks and for the first time provides reliable data to protect the integrity of the water quality, to enhance customer satisfaction and to improve operational efficiency. Highlighting the importance of this new development, Intellitect Water Chairman (and former Anglian Water CEO) Roy Pointer says, "The new technology will shine a light on an asset which today benefits from very little monitoring."**

## Background

In most developed countries the water distribution infrastructure is a very large and ageing asset. In the UK for example, nearly 400,000 km of pipelines serve domestic and industrial customers. Many of these pipes are cast iron and some date back as far as the 19th Century.

Corrosion to both the internal and external surfaces of Iron pipes can result in leaks and bursts which lead to a loss of treated water, a loss of pressure and water quality. Substantial investment is therefore necessary to maintain and improve the quality of the distribution network - in the UK alone, billions of pounds have been spent on pipeline rehabilitation since privatisation in 1989.

Clearly, access to real-time data on water quality, pressure and flow at appropriate locations within the distribution network will provide highly valuable information to water companies to assist with pipeline rehabilitation and for ongoing operational purposes.

In the early 1990s Yorkshire Water pioneered in-network monitoring, but it is only now that the relevant technologies have advanced to the extent that a viable product is ready for proliferation.

## The Technology

Founded in 2005, Intellitect Water has developed a small portfolio of products (Intellisondes™) that provide real-time monitoring data for water within the pipeline distribution network.

The technology has three vitally important features:

1. Patented, robust, highly accurate solid-state chlorine sensor
2. Multiple (up to 12) sensors inside a tiny sonde head that fits in the pipeline through a 1½ inch valve.
3. Low cost of purchase and ownership. (designed for multiple installations)

Measurement options include Free Chlorine, Total Chlorine, Monochloramine, Dissolved Oxygen, Conductivity, pH, ORP/Redox, Flow, Pressure, Temperature, Turbidity and Colour. Importantly, none of these require membranes or reagents and the sondes can be deployed for long periods without the need for frequent recalibration or maintenance.



(left to right) David Vincent, Tony Halker and Roy Pointer

David Vincent, the inventor and Intellitect's Engineering Director, believes that the company's Chlorine monitoring technology is a core competence, adding, "Chlorine is obviously a vitally important parameter for drinking water; our solid-state sensor is highly accurate ( $\pm 10\%$  ... significantly superior to DPD) across a broad range from 0.5 mg/l to 5 mg/l.

Patent applications are under way for both the chlorine sensor and its manufacturing process. The advantages of the sensor are that it maintains its calibration for up to 6 months; it has no membrane; no reagents are required, no waste stream is produced and importantly it fits inside a tiny sonde head which is inserted into the water pipe.

The probe can be fitted into large pressurised pipes (via a 3.8 or 5cm valve) as well as pipes only five centimetres in diameter, for street level monitoring. An adjustable collar allows the sonde to be set to a pre-determined depth, ensuring the sensor head sits in the middle of the flow. A variant of the sonde (Intellisonde SA – short application) enables continuous monitoring of a customer's supply by insertion into a water metering box.



Up to 12 sensors inside a tiny sonde head

Following initial work with eight water providers in the UK and a similar number overseas, it has been demonstrated that the Intellisondes™ are quick and easy to install by field operators with a minimal level of training.

In addition to the ability to store readings (up to 2 years of 15 minute data) Intellisonde™ is also able to output data in a wide variety of communications protocols with optional GPRS connectivity so that data can be viewed and downloaded remotely.

Data is collected by any computer running an Internet browser which opens a simple Graphical User Interface with 5 basic options: Status, Calibrate, Retrieve Data, Graph and Configure. Cleverly, the Intellitect design team has also included a facility for the Intellisonde™ to accept and transmit signals from other devices (mV, 4-20mA etc) that can then piggy-back on the communications capability.

## Application: Permanent deployment in distribution network

Deployed at strategic locations throughout the network, continuous monitoring enables efficient management of water treatment processes including disinfection. It also informs decision making in the rehabilitation process and other operational activities such as flushing and air scouring.

## Application: Industrial water intake protection

Businesses that rely on specific water quality are able to fit continuous monitors that provide proof of delivered quality and raise alarms if necessary.

## Application: Incident/complaint response

Historically, the normal response to any issues relating to tap water quality would be for a Water Company to dispatch a team of water

samplers equipped with sample bottles and/or DPD test kits or meters. There are four main problems with this approach: firstly, such tests are by definition a 'spot test' and therefore only give an indication of water quality at one moment in time, which may be after the problem has passed; secondly, it is normally necessary to be able to gain access to the customers' premises to obtain a representative sample; thirdly, the manual collection of water quality data is laborious and expensive; fourthly, the number of tests that can be undertaken in the field is limited, in terms of both the accuracy of testing and the range of tests that are possible. The Intellisonde™ SA resolves all four of these problems.

### Water Industry Perspective

A clear understanding of customer needs is critical to the success of any business and to this end; Intellitect's Board includes Directors with in-depth knowledge of the UK water sector. For example, Bob Baty was formerly the CEO of South West Water and Roy Pointer, mentioned above, occupied the same position at Anglian Water.

Commenting on his involvement with Intellitect, Roy Pointer says, "I decided to participate in the development of this technology because I recognised that it represents a tremendous opportunity for the industry."

"During my time in the water industry, often the first time we heard about a problem with tap water was when a customer complained, so this technology will, for the first time, enable water providers to take a proactive approach in safeguarding quality; dealing with issues before customers experience problems."

In recent years a large number of pipework interconnections have been made between different water networks and sources to provide a more reliable guarantee of continuous supply. This has increased the importance of Network Models as a tool to safeguard the pressure and quality of water supply. However, these models are largely hydraulic because historically it has been difficult and expensive to include water quality; the new Intellitect technology provides an opportunity to model water quality in these often complex networks.



*Intellisondes™ are quick and easy to install with minimal training*

An additional benefit of the new technology will apply to pipeline flushing and air scouring which can now be based on need rather than a rigid adherence to historic flushing programmes. This proactive approach can lead to more efficient network operations. Until now, flushing has been an activity that takes place after a set (estimated) period of time. However, the new monitors will reveal the most appropriate time for this to take place.

Summarising his views on the Intellitect technology, Roy Pointer says, "Operationally, water companies have key priorities; customer service, water quality and efficiency. This new technology can make a significant contribution to all three."

Looking forward, Roy Pointer says, "Once larger numbers of low cost monitors are installed in the network, it will become possible to accurately model Chlorine and other water quality parameters throughout the network in order to manage variations in demand and unexpected loading, whilst maintaining excellent water quality. This will enable the optimisation of Chlorine dosing for customer taste and perception."

"One of the other major benefits will be to remove guesswork from pipeline operational maintenance and rehabilitation so that the number of unnecessary excavations can be reduced. Furthermore, monitoring before and after the work will reveal the success or otherwise of the operation."

### AUTHOR DETAILS

**Tony Halker,**  
**Chief Executive**  
**Intellitect Water**  
 Unit 19,  
 Basepoint Business Centre,  
 Aviation Park West,  
 Enterprise Way,  
 Christchurch, Dorset, UK  
 BH23 6NW  
 Tel. 01202 651256  
 Web:  
[www.intellitect-water.co.uk](http://www.intellitect-water.co.uk)