

Hydrodata News

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Monitoring the Environment - Sales - Service - Rental

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Boscastle River Monitored

Following catastrophic flooding in Boscastle, Cornwall on 16th August 2004 a substantial scheme of improvements is being implemented and a SonTek/YSI continuous flow monitor, the Argonaut SW, has been installed to monitor the effects of the scheme and to provide background flow data.

'Rainfall levels up to 200.4 mm in one day were measured close to Boscastle on the day of the flood which is the 11th highest recorded daily rainfall in the UK since widespread records began in the early 1860s'



It is believed that one of the consequences of climate change will be more extreme weather events and the Boscastle flood would certainly fall into that category. Rainfall levels up to 200.4 mm in one day were measured close to Boscastle on the day of the flood, which is the 11th highest recorded daily rainfall in the UK since widespread records began in the early 1860's. However, the Environment Agency's Roger Bailey says "Most of the rain fell within a four hour period, and the intensity of the rain coupled with Boscastle's steep catchment lead to a rapid rise in the River Valency, instigating flows that have been estimated at 130 m³/sec in this 1 in 400 year event."

The River Valency caused millions of pounds worth of damage when it burst its banks. People were rescued by helicopters, homes were flooded and cars swept out to sea when about 440 million gallons of water swept through the village.

The flood defence scheme will cost in excess of £4.5m - major construction work was undertaken in Boscastle by contractor Carillion, to repair damaged buildings and revive the local tourist industry in time for Easter 2005. Further measures are currently being undertaken to reduce flood risk. This involves new flood walls and an increase in channel capacity by widening where possible and by excavation to lower the river bed.

The 2004 flood effectively scoured the river bed, removing gravel, rocks, and wildlife. Weirs and pools are therefore being created to provide new habitats. However, work was hampered during the summer of 2007 by two further periods of heavy local rainfall, each of which represented a 1 in 5 year event.

A nationwide study known as the Rapid Response Catchment Project is currently

underway to identify areas, such as Boscastle, that represent the greatest risk.

Whilst the Environment Agency is responsible for monitoring major river flows in Wales and England, it does not continuously monitor the many hundreds of minor rivers such as the Valency. Coincidentally level monitors had been installed in tributaries to the Valency during 2001.

Roger Bailey's team installed the level monitors as a result of concerns that statistical software tools for flood prediction are generally designed for larger rivers and not short, steep rivers and streams. However, level monitors do not generally give an accurate indication of flow, so



the more sophisticated Argonaut Doppler flow meter has been installed about 2km upstream of Boscastle.

The Argonaut SW (Shallow Water) is ideal for monitoring flows in small channels from <1 ft (0.2 m) to 16 ft (5 m) deep. It offers advanced Doppler performance for sites previously thought impossible to measure. Typically mounted on the



The River Valency,
Boscastle



The Argonaut

bottom of a channel, stream, or pipe, the SW measures water level and 2-D vertically-integrated velocity, making it ideal for sites with reversing or stratified flow conditions.

The Argonaut was chosen because it employs an advanced pulsed Doppler technique that integrates accurate velocity measurement from distinct known locations in the water column. The traditional lower cost Doppler method treats the body of water being measured as a single unit and does not have the ability to identify where the reflected sound has come from.

Cliff Willis, a member of Roger Bailey's hydrometry team, has designed an attachment for the Argonaut which anchors the device securely to the river bed (with a kerbstone) maintaining the sensing elements in the correct position.

One of the 2007 events resulted in a breakage

of the Argonaut's cable, however, Cliff was able to retrieve the device and download a complete set of data.

Cliff manages Argonaut data using a SonTek/YSI software package known as 'FlowPack'. He says, "The software allows me to generate easy to interpret Velocity-Index ratings and makes report creation simpler and faster. FlowPack stores flow, velocity, and stage measurements in one software program, which is very convenient." Cliff's experience of the Boscastle flood highlights the localised nature of the rainfall; he was sitting in a sunny traffic jam 15 miles away in Wadebridge when he was shocked to hear on the radio that helicopters were rescuing people from a torrential flood in Boscastle.

At present, data from the Boscastle Argonaut is stored within the instrument and collected periodically by laptop however, with an SD112 or MODBUS output, it will be simple to connect the

instrument to the Agency's telemetry system, whilst retain the data within the Argonaut for additional data security.

It is not currently possible to issue flood warnings for Boscastle based on flow data alone. Roger Bailey explains, "Small, steep catchments such as this can generate sudden increases in flow rates when high levels of rain occur in specific locations and when the ground's ability to absorb the rain is lowered either by a high moisture content or by the intense nature of the rain. It is therefore necessary to gather a complete picture of a catchment so that models are able to make accurate flood predictions."

It is intended that data derived from such installations will contribute to the ongoing refinement of national software tools for flood prediction.

Project Aims to Reduce Water Risk in Europe

An EU funded project estimated at €2.5M will aim to provide vital timely information for the management of pollution incidents in coastal areas and large rivers. Ian Thompson from project partner YSI Hydrodata (UK) says "The project will develop novel water quality monitoring techniques and use recent developments in communications technology to produce a network of monitoring stations integrated with a satellite based remote sensing equipment to provide a real-time monitoring network for diffuse and point source pollution. As a result it will be possible, for example, to monitor chemical leaks, spills and predict the growth of algal blooms."

The EU Water Framework Directive has stimulated a demand for greater monitoring data. It is now necessary to take measurements at more points, more often. However, water sampling and subsequent laboratory analysis is time consuming and costly. Furthermore, sampling frequency has to be set high in order to ensure that all water quality events are detected. This has created a need for continuous monitoring systems that are able to provide real-time data.

WARMER (WAter Risk Management in EuRope) is a research project funded by the EC 6th Framework Programme, under the IST-

Environmental Risk Management program aiming to fulfil the growing demands for real-time monitoring data.



The water quality monitoring system being developed within WARMER will be buoy mounted and include modular automated in-situ probes capable of making a variety of measurements including temperature, conductivity, ammonium, nitrate, phosphate, pH, redox, calcium, chloride, dissolved oxygen, lead, cadmium, copper,

turbidity, colour, mercury, iron, chromium, phenols, chlorophyll/phyto pigments in addition to water direction and flow.

Several of these parameters are measured by existing technologies within the YSI multiparameter sondes. A range of subsidiary development projects will seek to develop technologies for the remainder. These will include:

Potentiometric sensors, mounted in one or more multiparameter flow-cells measuring mainly inorganic ions and heavy metals; in the case of heavy metals, a specific preliminary digestion phase will be included (for dissolved and total metals).

Stripping voltammetry, working with screen printed electrodes for heavy metals with possible integration of biosensors working with the same detection system; phenol measurements will be tested using a specific selective sensor.

Colorimetric / fluorimetric techniques, running standard analytical methods.

Each monitoring station will be battery powered, with data storage capability and will be mounted on commercially available coastal buoys. Water monitoring data will be collected by a local remote programmable data-logger and a GPS device will spatially identify any collected data with time. Data will be stored and then transmitted using GPRS or other suitable telemetry technology to a sophisticated Web server system which will provide data visualisation in alphanumeric/graphic format, manage the data validation process and remote configuration upgrades.



Collecting data from monitoring stations mounted on coastal buoys.

Data collected by the buoys will be used to calibrate remote sensing data, automatically collected from satellites and processed using the DISMAR Web based system. Spatial and short-medium term water pollution forecasts will be produced to inform decisions on accidental spills in natural water resources.

Looking forward Thompson comments "This is a very exciting project which combines the skills and expertise of nine organisations from all over Europe including manufacturers, research institutions and universities. At YSI Hydrodata, we are market leaders in instrumentation to monitor the aquatic environment, this includes sensor technologies and integrated monitoring systems, so the benefit of our long history in the subject will be to ensure that the insitu monitoring equipment which is created by 'WARMER' will be robust, reliable and capable of producing good quality data.

The WARMER project will be of interest to many of our customers because they are often those with responsibility for the protection of aquatic resources."

The WARMER project will last until the end of August 2009 and it is anticipated that further announcements will be made as the project progresses and new technologies emerge.

The 9 WARMER participants are as follows:

- Institute of Electron Technology, (Poland)
- Nansen Environmental and Remote Sensing Center, (Norway)
- Politechnika Warszawska, (Warsaw University of Technology), (Poland)
- Research Institute of Chemistry of St. Petersburg University, (Russia)
- Systems Technology Advance Srl, SYSTEA (Italy)
- The University Court of the University of Aberdeen, (UK)
- Universitæet fuer Bodenkultur Wien, (Austria)
- Universitat Autònoma de Barcelona, (Spain)
- YSI Hydrodata, (UK)

Intake Protection System is 'Absolutely Brilliant'

Severn Trent Water was one of the first utility companies to try YSI's new multiparameter intake protection system, the 'HydroSAM', and works manager Natalie Horton says;

"The performance of the new water quality monitor has been absolutely brilliant."



The HydroSAM is designed to replace older water quality monitoring systems which draw samples through a network of pipes leading to a series of in-line sensors.

Until now, these wall mounted systems have been installed to monitor water quality upstream of river abstraction points, so that plant managers are provided with data allowing active water treatment decisions. However, such aging systems require a high level of maintenance and frequent calibration.

In contrast, the HydroSAM has been designed for minimum maintenance and long-term deployment. The heart of the HydroSAM is a multiparameter probe known as a 'sonde', thousands of which are in use all over the world as insitu water quality loggers in both freshwater and marine applications.

Water quality monitoring sondes are often left in remote and difficult to access locations and it is for this reason that YSI has, over many years, developed sensor technology that is able to take

accurate readings without the need for frequent site visits.

The sondes have also been designed to be compact and this provided a further benefit to the HydroSAM; river water is pumped through a single sample chamber in which the sonde is located, so that all of the sensors are exposed to the same sample.

The HydroSAM employed by Severn Trent Water monitors pH, temperature, conductivity, turbidity, dissolved oxygen and ammonia, it is also possible to add sensors for chlorophyll and blue/green algae.

The sequence of events that ended with the installation of the HydroSAM began with Natalie Horton becoming increasingly frustrated with the problems and high maintenance requirements associated with traditional monitoring systems. However, she had heard that the Environment Agency deploy multiparameter sondes in rivers and approached YSI Hydrodata to discuss the possibility of their use for intake protection.



As a result, a sonde was installed directly in the river Severn upstream of the Shelton WTW near Shrewsbury on a 3-month trial. Prior to the trial, Natalie Horton admitted to a fair degree of scepticism over the sonde's ability to cope with occasional high levels of fouling. However, after visiting the site, she said that she was "Delighted to discover that, as a result of the inbuilt sensor wiping mechanisms, the sensors were completely free from fouling and the readings correlated very closely with our own calibrated equipment."

Following the success of the trial, Severn Trent Water ordered a full HydroSAM which has been permanently installed ten miles upstream of the water intake. The system provides almost

continuous monitoring data to the Shelton works and operators have been provided with the facility to dial in to the unit from anywhere or to visit the site and collect data with a portable computer. Alarm conditions have been set and the unit will issue alarms via the PCMS should those conditions arise.

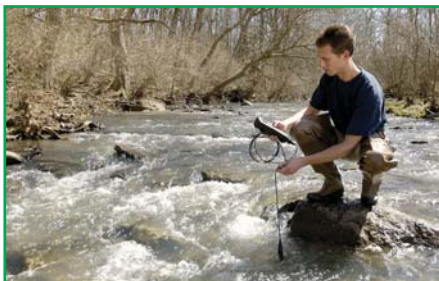
Natalie Horton has since become Risk and Safety Manager for Water Supply at Severn Trent Water. Looking back over the HydroSAM trial she says "It is vitally important for our water treatment works to be provided with advance knowledge of water quality and trends so that we can manage the treatment process as effectively as possible. It is always our aim to maintain stability in the plant because unforeseen changes in the intake could necessitate a need for reduced flows to maintain water quality.

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"...site visits used to be necessary every week, but now a simple 6-weekly calibration check is all that is needed"

For example, turbidity can range from 1 NTU to over 200 NTU, but this can be accommodated quite easily if we have an accurate and reliable intake protection system., The main benefits for us have been the reduced requirement for calibration and maintenance; site visits used to be necessary every week, but now a simple 6-weekly calibration check is all that is needed. We have been delighted with the HydroSAM - it was simple to install and operate, it has proved to be reliable, and it saves labour costs."

New YSI Water Quality Meters 'designed' by Users

LAUNCHING the new YSI Professional Plus handheld water quality monitors, YSI says that the range has been developed specifically in response to customer requests for versatility and field worthiness.



The handheld meter is 'universal' which means that customers can buy exactly the probes and cables that they need. However, the flexibility extends much further; a docking station enables USB PC connection which opens up a wealth of new features.

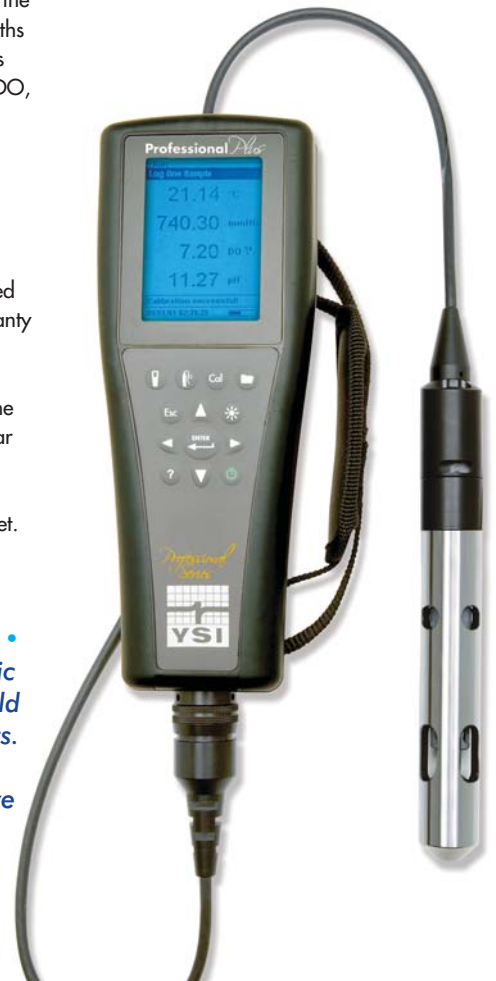
The instruments can be set up from the PC with easy-to-use 'Data Manager' software and this is particularly helpful for those with more than one meter; a single configuration can be created on the PC and simply loaded onto multiple meters. Similarly, site names can be stored in the PC so that data is automatically appended to individual site files through a smart recognition system. Importantly, all QC/config data is stored with the data.

The new instruments offer multiple options in the choice of probes, accessories and cable lengths (1m, 4m, 10m, 20m or 30m). Sensor options include Ammonium, Chloride, Conductivity, DO, Nitrate, ORP, pH, Lab BOD, Barometric Pressure, Total Dissolved Solids, Salinity and Temperature. Readings can be taken at set intervals, as a single event or with real-time logging to a memory with 2,000 data set capacity and GLP file output. With regard to field-worthiness, the instruments are so rugged that YSI is offering a 3-year instrument warranty and a 2-year field cable warranty.

Whilst there are numerous applications for the Professional Plus instrument, there is particular interest in the Surface Water, Aquaculture, Groundwater, and Wastewater markets as a result of the product line's extensive feature set.

According to YSI Regional Director, Darren Hanson;

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"The Professional Series is fantastic news for anyone involved with field or lab water quality measurements. We have built many new features into these new relatively inexpensive meters and we are extremely grateful to those customers that provided invaluable feedback to make that possible."



For further information please contact:

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