

Integration of LIMS and Remote Sampler at Northern Ireland Water Delivers Enhanced Audit Trail, Significant Time and Cost Savings

By Colin Thurston, Director of Product Strategy, Process Industries, Thermo Fisher Scientific

Northern Ireland Water is the sole provider of water and sewerage services in Northern Ireland. It is a Government Owned Company (GoCo) established in April 2007 to serve approximately 795,000 domestic, agricultural, commercial and business properties connected to the public water supply and 660,000 properties connected to the public sewer system. Every day Northern Ireland Water (NI Water) supplies 625 million litres of clean water for nearly 1.7 million people, and each year the agency treats 134 million m³ of wastewater.



Northern Ireland Water Field Sampler

NI Water has offices across Northern Ireland, with a head office in Belfast. The agency uses 1,400 people to deliver its water and wastewater services via a huge system of pipes, pumping stations, water and wastewater treatment works and reservoirs. Northern Ireland has 26,500 kilometres of water mains and 14,500 kilometres of sewers (enough, when combined, to stretch from Belfast to New York and back four times).

NI Water supplies water for domestic use or food production, both of which must comply with the Northern Ireland Water Quality Regulations, including European Union standards and more stringent UK national standards. Every year, NI Water's state-of-the-art laboratories in Belfast and Londonderry carry out over 150,000 sophisticated tests to ensure quality standards are met; water samples are taken from service reservoirs, water treatment works and taps in customers' homes. The Drinking Water Inspectorate (DWI)

within the Environment and Heritage Service also independently audits these tests and issues a report each year on its findings.

NI Water installed Thermo Scientific SampleManager, a laboratory information management system (LIMS), as part of its continuous focus on improving the efficiency of its sample management process and the integrity of the samples collected from the field. The agency also implemented CSols Remote Sampler: handheld devices for use with field sampling. Remote Sampler allows field samples to be taken and recorded in situ and uploaded directly into the LIMS, thus saving time, reducing transcription errors and providing a secure record of sampler locations. NI Water invested in this integrated approach, linking its enterprise-level LIMS with a remote field-testing device, to further build on the agency's technology advances and to cement its public position as a trusted provider of the public water supply.

Business Challenge

In 2001, in an effort to ensure that NI Water (then known as Water Service) continued as a trusted and reliable public service provider, the agency outlined a requirement for a new LIMS system. At the time, the company's laboratory facilities were using an in-house, customised LIMS with a labelling function with prefixes (95 for samples taken in the year 1995, and so on). Once Water Service reached a regulatory critical mass in the year 2000, however, the agency realised it needed a new, more robust and efficient solution, according to Gareth Maxwell, LIMS and Compliance Reporting Manager at NI Water.

Specifically, the new LIMS system had to meet the requirements of the Drinking Water Quality Regulations Northern Ireland 1994 and 1995, and because NI Water was a government agency there was added pressure to invest in a highly-sophisticated and reliable system offering system-wide integration capabilities and robust processes.

The LIMS was required for three main tasks:

- Receipt of samples for chain of custody from field procurement
- Sample login and storage at NI Water laboratories
- Results and reporting to management and regulatory agencies

Implementation

The SampleManager implementation went live in January 2002. Since its implementation, the system has been upgraded four times to keep pace with regulatory requirements and software version updates or enhancements, illustrating that the LIMS has the flexibility to easily accommodate and upgrade as necessary to any major Microsoft OS enhancements.

Today, samples are logged into a central repository which includes the following steps: sample receipt, login, barcodes and transfer to labs. "We have sample reception facilities at both sites. We have a two-scan process; the first scan identifies that the bottle has been received and the second scan identifies that the bottle is in the correct laboratory for analysis," said Maxwell.



Remote Sampler Installed in NIW Van

Additional NI Water and Industry Needs

In addition to the LIMS requirements, NI Water also needed a way to automate existing manual collection of field samples that would integrate with the LIMS but not make the samplers' jobs any more difficult or onerous. The goal was to make the field sampling process more efficient and improve the audit trail. Discussions at user meetings revealed that ruggedised personal digital assistants (PDAs) would be an ideal solution as they are small, easy to use and have a number of useful technologies built in, such as GPS, GPRS, bar code readers, Wi-Fi and Bluetooth.

When selecting the solution, NI Water consulted with both Thermo Fisher and CSols, which had previously provided a direct data capture for NI Water's ICP and other laboratory instrumentation using CSols Links for LIMS. All field testing and water quality sampling is now done using ruggedised Remote Sampler PDAs, which include GPS functionality to



Testing Water Samples

provide accurate sample location, and barcode scanners to scan the labels on sampling containers to give additional proof of location. The Remote Sampler PDAs then deliver sample information to SampleManager LIMS, and the LIMS in return feeds collection and workflow data to the PDAs so field personnel are continuously updated on priorities, sample collection locations and specific testing requirements.

The integration of a remote sampler field testing system with an enterprise-level LIMS has delivered essential transparency between data gathered in the field and management reporting generated by the LIMS. The automation of both the front-end sample collection and back-end reporting has eliminated manual transcription errors and the quality of both NI Water samples and reporting are enhanced.

"We have introduced Remote



Northern Ireland Water Laboratory Technician

Sampler in the field for all our water-quality samplers," said Maxwell. "The use of field sampling allows us to ensure that all samples taken in the field are accurately recorded, taken where they are claimed to be and input into the LIMS at source. This saves time and facilitates the data management."

For NI Water, the entire sampling process has been enhanced. At sample reception, the time from when the sample arrives to commencement of analysis is improved, saving the water sample reception in excess of two hours per day. Once the system is rolled-out to trade, waste and ad hoc sampling, NI Water estimates that it will save in excess of three hours per day, translating into significant cost savings.

NI Water has also improved the integrity of samples across two geographical areas, as well as the accuracy of the sample data. Field sampling allows NI Water to prove exactly where every sample was

actually collected—the GPS ensures that customer tap samples are collected in the correct supply zone as the new address is checked against an on-board database. The system also allows sampling staff to move around and exchange workloads to suit NI Water's business needs, as the samplers no longer require training regarding site locations (the onboard GPS software gives them turn-by-turn directions to the sample point).

The Future

Going forward, NI Water's contracted samplers will be able to report on acceptability of sampling points and the safety of sampling sites. This information can then be added to the management report for any remedial action, greatly enhancing NI Water's ability to provide solid documentation for regulatory audits or routine inquiries.

"With SampleManager LIMS in place and our investment into remote sampling with LIMS, NI Water is setting the benchmark in the future of water testing in Europe," said Maxwell. "This solution puts NI Water in the leading edge of extracting real benefits from our quality testing program. NI Water will have better sampling audits than most other UK water utilities currently."

In the future, the use of GPS will facilitate automatic route planning to maximise the efficiency of the sample run, having a direct positive impact on workflow and personnel planning. More efficient route planning should mean samples arrive at the laboratory earlier and in better condition, thus enhancing the quality of the testing.

NI Water also hopes to integrate mobile broadband within the PDAs via a data SIM card instead of docking the device in the laboratory. This will enable the samplers to send data directly to the LIMS from the field.

Conclusion

With both a regulatory- and efficiency-driven rationale, NI Water has equipped its laboratories with the technologies and infrastructure that ensures the quality of its drinking water. To deliver consistent, reliable service while demonstrating regulatory compliance, NI Water standardised on SampleManager LIMS in its laboratories. The LIMS has improved operational efficiency, providing NI Water with a full sample recording, management and reporting system, while automating workflow and integrating with other laboratory instrumentation and system.

The integration of an enterprise-level LIMS with a remote field-testing PDA in CSols Remote Sampler has improved the efficiency and security of data entry and greatly enhanced sample identification and tracking. Because all samples are now recorded on a single electronic database, the integrated solution has provided NI Water with a means to retrieve and report data in a way that would never have been possible previously.

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New Automated Immunoassay System to launch at FOCUS 2013

bioMérieux, a world leader in the field of in vitro diagnostics, will showcase the new VIDAS® 3 automated immunoassay system at this year's ACB FOCUS Exhibition. This event, from the 15th to 18th of April, will give visitors the opportunity to explore the increased automation capabilities and greater traceability offered by the latest generation of the VIDAS platform.

VIDAS 3 has been designed to help healthcare professionals meet the new challenges of a rapidly changing regulatory and economic environment. The user-friendly system enables laboratories to carry out on-demand testing 24 hours a day, improving assay performance and turnaround times for both routine and urgent tests. It provides accurate and reliable results, using the same reagents as the other instruments in the VIDAS range, with over 98 tests currently available.

The system features an intuitive, customisable touch screen interface and includes a built-in quality control program to simplify day-to-day performance monitoring. In association with bioMérieux's myQC quality control product, this will enable laboratories to compare their results with those of hundreds of other laboratories, helping to ensure a rapid and reliable response to clinicians' requests.



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Updated Platform Eases Data Bottlenecks in Research Informatics

IO Informatics have announced the commercial release of its new Sentient Knowledge Explorer 5.0 for analysing, visualising, and managing data.

Semantic technology is rapidly becoming a ubiquitous integration, discovery and knowledge building resource, applied across a growing number of healthcare and life science research environments.

"A key limiting factor in the broad adoption of semantic technologies has been the burden of managing large data sets and the sophisticated informatics necessary to make information useful and accessible to researchers," said Dr Gombocz, Vice President and CSO of IO Informatics. "By combining scalable semantic integration tools with an easy-to-use visualisation and search environment, IO Informatics removes the integration bottleneck in research informatics. This combination reduces time and cost to qualify experimental results through a systems-biology approach."

"The Sentient Knowledge Explorer was built to be powerful but simple to use and easy to deploy. Our KE Pro creates seamlessly linked data that is scalable, interoperable and adaptable to the rapid innovation common in informatics research," said Robert Stanley, President and CEO of IO Informatics. "In addition to improved core integration functions, our latest release dramatically improves our ability to work with 'big data' resources by providing best-in-class graph layouts, zooming functions and performance with large datasets. We are committed to working with our users and leading experts to ensure that IO continues to evolve and meet the needs of this exciting and dynamic market."

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New Fully Automated Dumas Nitrogen/Protein Analyser

Velp Scientifica presents the NDA 701 Dumas Nitrogen Analyser, extending its range of instruments dedicated to sample preparation and analysis in the food and feed industries.

The NDA 701 uses high-technology to optimise productivity. With the highest limits of detection and readability on the market and an RSD lower than 0.5% for EDTA, the user is assured of high precision results. Samples can be loaded in nearly 120 positions, using the same loading procedure whether solid, paste or liquid. Once loaded, the unit runs fully automatically offering exceptional reproducibility and comparability of results.

The DUMASoft™ software presents the program parameters, run conditions and results on a single screen of your PC making operation quick and simple. Different calibration curves can be created and managed and an on-board database containing methods for numerous sample types and different nitrogen standards can be used to optimise analysis of specific samples. Data can be shown via on-board versatile reporting with output to a PC or LIMS in .xls, .txt or .csv formats for manipulation using the operator's preferred software.

Velp Scientifica NDA 701 complies with all standards in the food and feed markets – AOAC, AACC, ASBC, OIV and ISO – making it the ideal choice for industrial and monitoring laboratories.