



LABWORKS LIMS Solutions for Water and Wastewater

LIMS Helps Lab Obtain Accreditation and Increase Throughput

Implementation of a new Laboratory Information Management System (LIMS) has helped the Portland, Oregon

Bureau of Water Works obtain National Environmental Laboratory Accreditation Program (NELAP) accreditation while increasing laboratory throughput. Water quality laboratories across the country face the need to perform a higher volume of testing and improve data security in order to ensure the safety of the nation's water supply. After determining that their previous paper-based system would be hard-pressed to meet upcoming regulations, the technical staff selected a LIMS that demonstrated the ability to adapt to their existing workflow, eliminating the need for disruptive and potentially expensive custom coding. "Implementation of the new LIMS has improved our control of data to the point that we can now easily determine exactly who entered or changed any piece of information and when and why it was done," said Alberta Seierstad, Laboratory Manager for the Portland Water Works. "The new LIMS has also helped us increase throughput by automatically scheduling most samples and allowing field data to be collected on handheld computers and uploaded to the LIMS."

Key Features

- LW Process Scheduler
- Instrument Interfaces
- LW Explorer
- Barcoding
- SQC
- QA/QC
- Report Designer

The Bureau of Water Works operates the water supply system that delivers high-quality drinking water to more than 830,000 people who live in the Portland metropolitan area. The primary water source is the Bull Run Watershed located 26 miles east of downtown Portland, Oregon in the Mt. Hood National Forest. Portland also uses groundwater as a supplemental water supply. The city's water quality laboratory is staffed by seven people who perform a wide range of tests designed to ensure the quality of the city's water supply including tests for bacteria, physicals, nutrients, organic compounds and biological parameters such as chlorophyll and algae. The lab operates 6 days a week and analyzes approximately 10,000 samples per year, performing about 100,000 analyses on those samples.

Water labs facing higher demands

Seierstad said that the requirements faced by the lab have progressively increased over the past few years, particularly after the lab was required to obtain accreditation through the NELAP program in the state of Oregon. The National Environmental Laboratory Accreditation Conference (NELAC) is a voluntary association of state and federal Agencies formed to establish and promote mutually acceptable quality standards for the assessment and operation of environmental laboratories. A major goal of NELAC is to assure that decisions made from analytical data have a sound technical, scientific and statistical basis. NELAP is the program that implements the NELAC standards to help assure that the NELAP-accredited laboratories deliver data of the required level of quality. In Oregon, the State Department of Human Resources administers the Oregon Environmental Laboratory Accreditation Program (ORELAP). Some of the requirements specify that laboratories must prevent changes to analysis data and enable the reproduction of original results by linking data and outcomes. Traceability must be guaranteed by a secure audit trail. Laboratories must be able to retrieve stored data for a specified number of years.

"The new regulations go considerably beyond what was required of us in the past," Seierstad said. "We could have potentially met them with our old paper-based system but it would have been an enormous challenge to ensure against, for example, the possibility that someone could have simply thrown away a piece of paper and replaced it with a different one." Even prior to the requirement to seek NELAP accreditation, management had already made the decision to implement a LIMS. They reasoned that a LIMS inherently provides a far superior platform for meeting the new regulatory requirements. Leading edge LIMS automate the process of ensuring data integrity by limiting access to data to authorized users. The more advanced systems automatically generate an audit trail that makes it possible to trace the history of any particular piece of data.

LIMS selection process

The process of selecting a LIMS began by identifying key stakeholders in the decision, including all laboratory personnel as well as key information technology staff members and a variety of water operations personnel. A core team of six to eight people, including key lab users, IT staff, regulatory compliance reporting staff and an operations staff, handled the day to day decision-making while a larger group was brought together when needed. The lab selected Black and Veatch as consultants to help conduct planning, needs assessment, workflow analysis and processing mapping, as well as surveying available LIMS products and developing a request for proposal (RFP). Seierstad and her staff visited several labs that were actively using the LIMS products under consideration.

Vendors demonstrated their products for the selection team and other interested persons. The vendors submitted written proposals and the selection team reviewed and scored the proposals and chose three finalists. Each of the three finalists presented a demonstration based on a script that was designed to highlight the ability of each system to address the lab's current workflow and NELAP requirements.

The decision was made to select LABWORKS™ LIMS from PerkinElmer. LABWORKS is consistently ranked at the top of major industry surveys. "We selected LABWORKS because it came the closest to being able to meet our requirements out of the box," Seierstad said. "The PerkinElmer scripted demonstration showed LABWORKS performing a series of scenarios that mirrored our daily operating procedures. We

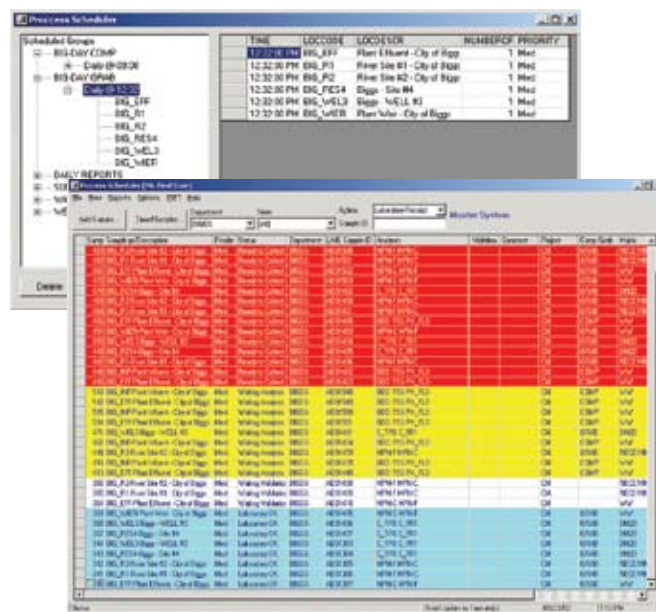


Figure 1. The LABWORKS Process Scheduler automates manual tasks to improve laboratory operations.

were surprised that LABWORKS was able to handle our current workflow and meet many NELAP requirements without any customization. Their presentation demonstrated that the software was flexible enough to adapt to our needs so we could maintain our existing business processes with only minor modifications. It also eliminated the need for extensive customization that would have driven up the cost of the system, delayed implementation and raised the risks of running into problems down the line.”

“At the beginning of the project, an IT person, Sisay Mengistu, was assigned to the laboratory work group to work full-time on this project,” Seierstad said. “By working full-time on the project, Sisay was able to become very knowledgeable in the operations of our laboratory. He brought an IT perspective to the project that helped to avoid downstream problems. The LABWORKS Product Specialist directed the implementation process from the vendor’s side. We walked him through our workflow in detail, went over the NELAP requirements and also filled him in on some of the things we were planning such as enabling our sample collectors and field engineers to enter data into handheld computers and syncing them with the LIMS,” Seierstad said.

No coding required

“I was able to use LABWORKS’ built-in tools to mold the software to their lab process and accreditation requirements without having to do any coding at all,” the LABWORKS Product Specialist said. “The base software already meets the NELAP requirements by providing features such as electronic signatures and traceability of data from time of

entry through all succeeding business processes. The next version, which is due out shortly, will go considerably further by providing a single centralized point of authentication that controls access to all applications and data. We configured the results entry portion of the program to accept data from the handheld computers and also to accept input from four instruments providing pH, conductivity, turbidity and color measurements at a single workstation. Finally, we designed 20 custom reports to match and exceed their existing reporting requirements. Besides installing and testing the software and training the users, that was about all that was needed to get them up and running.”

Seierstad said that the new LIMS has substantially improved laboratory operations. “We have automated a number of previous manual operations,” she said. “For example, the majority of samples are now scheduled automatically by the LABWORKS Process Scheduler module. Most test results are electronically entered into the LIMS through direct interfaces. The entry of field data with handheld computers eliminates what used to be an additional data entry step. The new system has also automated many calculations that were performed by hand in the past, saving time and improving accuracy. In addition, we have a clear record of each sample and each result that was generated including an audit trail and validation records. The rest of the PerkinElmer staff were very responsive to our needs throughout the process. All of the major project elements were completed on time and within budget. All in all, this was a successful project that met our objectives and will continue to pay dividends many years in the future.”

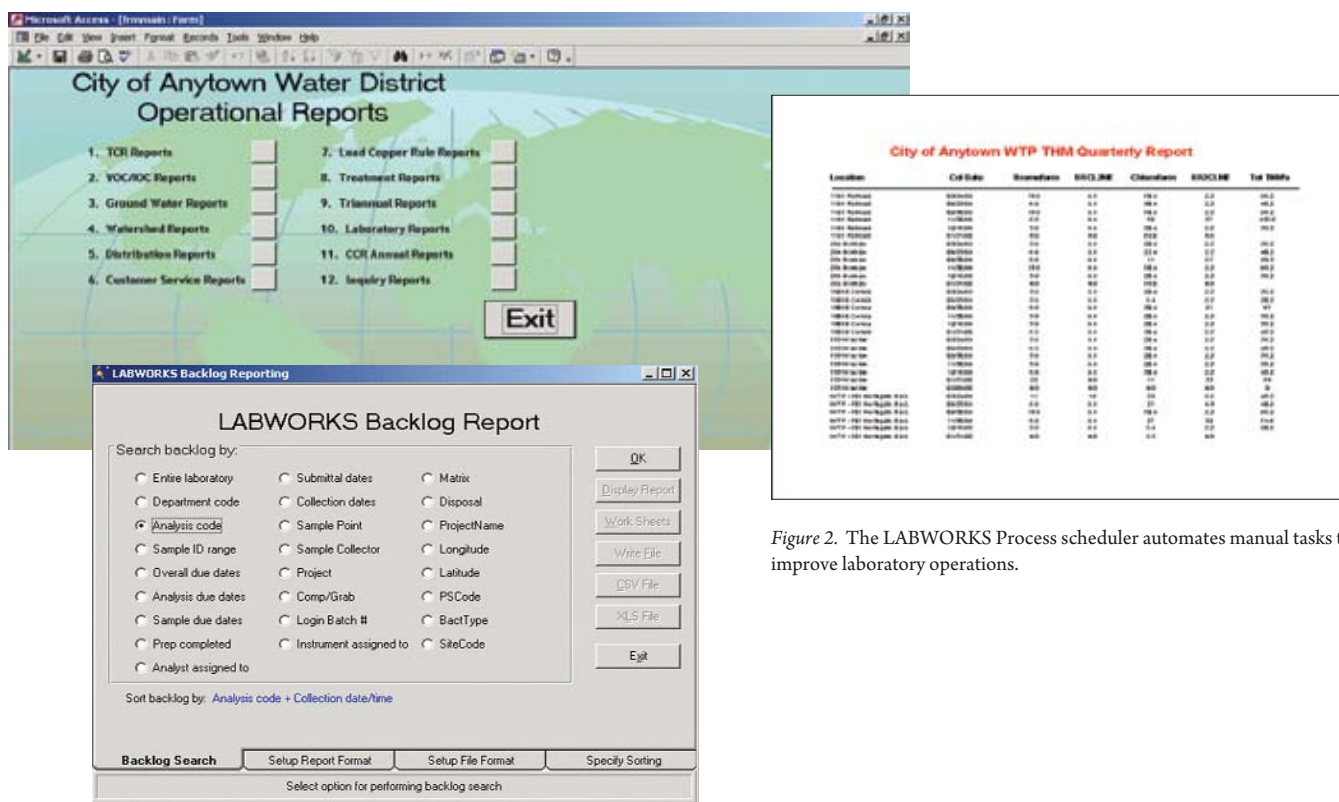


Figure 2. The LABWORKS Process scheduler automates manual tasks to improve laboratory operations.

Acknowledgements

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Optional Applications for the Water/Wastewater Industry

Option	Description
Process Scheduler	Plant wide ad-hoc sample scheduling/monitoring. The simple user interface makes it easy for non-LIMS users to add a sample request and assign tests, priority and collection status. Laboratory and sample collection personnel can prioritize sample collection, laboratory analyses and print labels. Color-coded statuses make sample tracking simple.
Barcode	LABWORKS offers a variety of different barcode readers and barcode label printers based on customer needs.
Instrument Interfaces	PerkinElmer provides over 100 instrument interfaces to LABWORKS. Most any standard laboratory instrument can be interfaced including PerkinElmer instruments.
LWExplorer	Explorer is a browser-based interface to LABWORKS that permits read-only data to be viewed in a Windows® explorer format familiar to non-LIMS users. Views are limited by sample ownership, status and age. Users can print reports, view exceptions and generate SQC charts from viewed data. COA's, invoices and management reports such as backlogs, progress and sample summaries are included.
QA/QC	Customized statistical quality control charting and analysis that allows the LIMS to search and sort the database, write properly delimited data files, header files and batch processing files for NWA Quality Analyst® for Windows® software. Allows graphic display and printing of charts such as standard Shewhart charts with related X-Bar & Range. Statistical Reports may be printed as well.
Report Designer	The LW Report Designer package includes a fully integrated report writing tool using the market-leading Crystal Reports® technology. All functionality is internally integrated into LABWORKS ES and allows users to begin building their Crystal Reports® right away. Additional Crystal utilities can be added that allow users to publish reports to a web site – internally or externally – for your organization or customers to view via their web browser. The package also comes bundled with 15 fully functional and ready-to-use example reports that include sample receipts, analysis turn-around reports, charts and graphs, etc.

PerkinElmer, Inc.
940 Winter Street
Waltham, MA 02451 USA
P: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com



For a complete listing of our global offices, visit www.perkinelmer.com/ContactUs

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