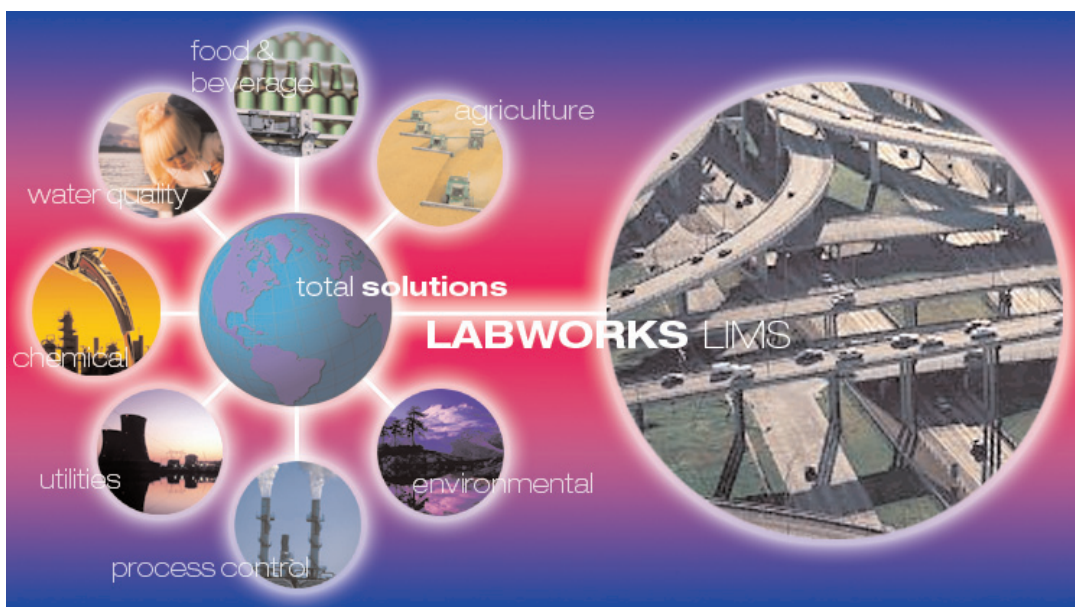




# LABWORKS LIMS Solutions

## Department of Transportation



### LIMS Helps Transportation Lab Improve Efficiency and Accuracy

Implementation of one of the first Laboratory Information Management Systems (LIMS) in a transportation materials laboratory has helped the lab improve efficiency and accuracy while improving access to test results. The New Hampshire Department of Transportation (NHDOT) laboratory in Concord, NH tests materials used in construction projects in the state, a field in which relatively few labs have implemented LIMS up to this point. The lab selected a PC-based LIMS that can be configured to handle all common laboratory operations without the custom programming that is required by more traditional sys-

tems. The new software has automated a wide range of tasks, such as the job of calculating the proportion of various size particles in a sample based on their weight. Data reports can be automatically generated in the proper format, saving a significant amount of time in the reporting process. Improved accuracy is another benefit. Test results are now entered into the system by the person who performed the test, reducing the risk of errors in keyboarding information from paper forms. "We have already achieved significant benefits and established a platform that will allow us to make even greater improvements in the future," said Alan Perkins, Chief of Materials for NHDOT.

### Key Features

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

NHDOT is responsible for developing and maintaining the state's transportation network. Its Division of Project Development plans and designs transportation projects and oversees their construction. An important role in this division is played by the Materials & Research Bureau, which has the job of testing the materials used in projects in order to ensure their safety and durability. As part of their job, the bureau tests a wide range of road and bridge materials including concrete, asphalt, soil, paints and others. Test equipment used by the department includes compression machines, scales, atomic absorption, ultraviolet spectrometers and gas chromatographs. For example, in a very common test performed by the bureau, called gradation, a soil or aggregate material is run through a series of sieves that are graduated so that each sieve catches materials of a successively smaller size. By weighing the material that is collected by each sieve, engineers can determine the proportion of material of each size in the sample. The proportions of materials are then compared to the Department's specifications.

In the past, the laboratory relied mostly on manual methods for sample login and tracking and creation of reports. When a sample was received, a technician would fill in a worksheet with basic information such as the date, type, where it was collected and by whom. The worksheet was then passed to another person who performed the test and executed any necessary calculations. The final results were then entered on the worksheet and passed to the clerical staff. A member of the clerical staff would keyboard the information on the worksheet into a template that was used to produce the final report. Bureau management felt that there were several areas of this process that had the potential for significant improvements. First of all, a considerable amount of time was needed to keyboard the information from the paper forms and format the final reports. When this information was entered, there was always the



Fig 1. Glenn Davison of the New Hampshire Dept. of Transportation Materials Testing Laboratory.

possibility for errors such as transposing a pair of numbers. Another problem with manual reports is that it was difficult and in some cases impossible to evaluate test results in comparison to relevant results from the past, such as tests performed on a similar project that was completed several years ago.

### Selecting a LIMS

Alan Perkins initiated the project to implement a new LIMS and Glenn Davison of the Bureau of Information Technology Services (ITS) was assigned as the Project Manager. The goal was to provide for long-term storage of material test data, electronic generation of reports, graphical representative of material variability and trends, sample tracking and information training. "We wanted a system that was personal computer based and could be implemented without a large amount of custom programming," said Davison. "We prepared a request for proposal, interviewed the vendors that responded to our request and had the vendors demo their products. Our selection was based on which prod-

uct we felt would best fit our needs and which company would give us the best service. LABWORKS stood out because we met with the people that later served as the implementation team and gained confidence in their ability to work with us to understand our needs and help us configure the product to meet them." said Alan Perkins.

LABWORKS, from PerkinElmer Instruments, Shelton, CT, is a packaged product that meets nearly all of the requirements of nearly all laboratories out of the box without customization. In most cases, the program can be installed in a matter of weeks with a fraction of the resources required by a conventional LIMS. Beyond that, the program can be configured by users to store the exact information they need, perform calculations and prepare reports in the exact format desired in a matter of months. Another major LABWORKS advantage is a three-tier architecture with database portability that uses the same code regardless of the database or operating system it is being run under. This feature makes it easy to, for example, start out with a less expensive Access database and migrate to Oracle as one's needs increase while avoiding the need for re-coding or retraining users.

### Implementation process

Nancy Tkach, Laboratory Scientist and Jim Mitchell, Ride Quality Supervisor with the Materials and Research Bureau, were assigned to be system managers to aid in the implementation process. "We started by analyzing every task in the laboratory so that it could be mapped onto the LIMS system," Tkach said. "LABWORKS made the task simpler by providing the ability to read the spreadsheets that we were already using to perform calculations and reproduce them. A critical factor in the success of the implementation was the willingness of PerkinElmer to provide a server in their facility that we could use for initial configuration and training. Their service people addressed any issues that arose.

“During implementation, we configured the software to automate many of our existing processes,” said Jim Amrol, The Concrete/Soils Supervisor. Now samples are logged in on electronic forms that look nearly identical to the worksheets used in the past. Technicians enter the test results directly on the electronic forms, eliminating the time required to type these results in later as well as the errors that could sometimes result. While the LABWORKS program is capable of accepting measurements directly from instruments, most of the bureau’s current instruments do not have this capability. When new instruments are purchased, the bureau plans to select models that can utilize interfaces to the LIMS. The test results are sent to an Excel spreadsheet where calculations are performed and the results are returned to LABWORKS. While the process is automated, users can easily access the spreadsheet to view the calculations. The final step is that the results are formatted for reporting purposes and printed.

### Improved efficiency and accuracy

“While we have only completed the first phase of the implementation process,” Perkins said, “the benefits are already apparent. Our clerical staff is saving a considerable amount of time because they no longer have to keyboard the test results. We have eliminated the potential for error both in keyboarding results and in performing calculations. Most important, we have gained immediate access to all results entered into the LIMS so we can make better use of them by, for example, performing trending analysis that will allow us to detect a problem and make corrections long before the material goes out of specification.” We also set up a number of cross-reference searches that allow members of our staff to easily find information they need. For example, one of these searches makes it possible for a user to enter a project number and two dates and brings up all the tests results on the project between those two dates.”

Perkins said that the bureau expects to achieve even greater savings in the near future by automating the distribution of reports. “Right now we are still spending a considerable amount of money on printing and mailing reports,” he said. “Our goal is to make the data available electronically and stop sending out 80% to 90% of the reports. Our users can access the reports when they need them by logging into our server. Besides saving money, this approach will also save a considerable amount of time, which can be important because in some cases contractors can’t start a job until the reports arrive. Right now, it could take a day or two to get the reports into the mail if our clerical

staff is busy and could take a few more days until they arrive. Our plans are to have this electronic approach in place for the 2003 construction season which starts in spring of that year.

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Optional Applications for the Transportation 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 Life  
and Analytical Science**  
710 Bridgeport Avenue  
Shelton, CT 06484-4794 USA  
Phone: 800-762-4060 or  
(+1) 203-925-4600  
[www.perkinelmer.com](http://www.perkinelmer.com)



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