

Next-Gen Data Management

Facing challenges with more dynamic data access

By Carla Huelsenbeck

The ever-growing demand for accurate and reliably-documented environmental testing that incorporates increasingly complex analytical instruments is also driving a demand for more sophisticated and efficient data management systems. Across businesses and municipalities there are countless instances in which proper data management can mean the difference between success or failure of an environmental project. For example:

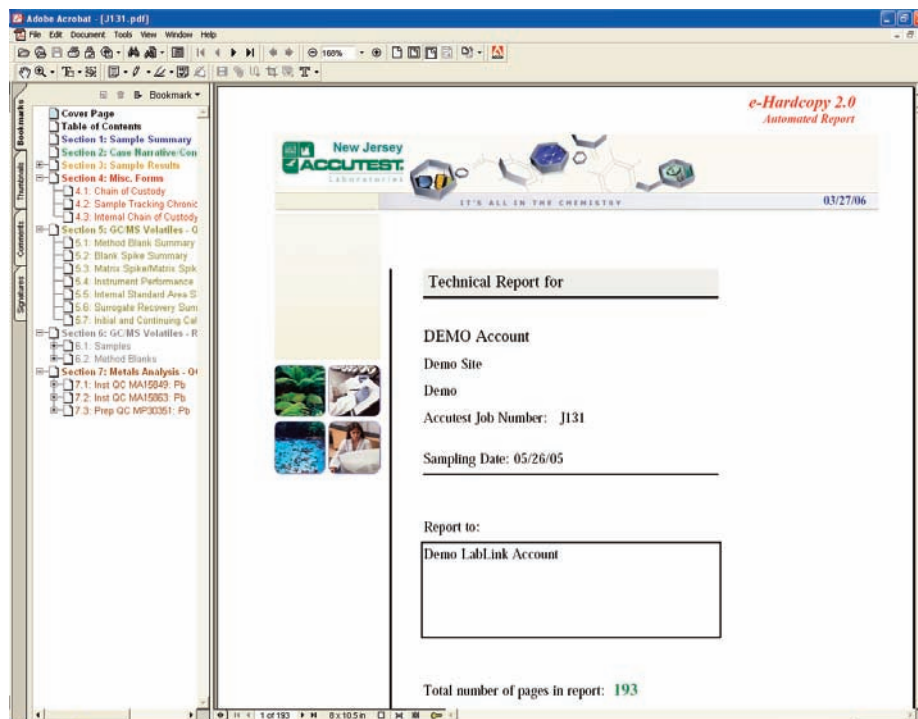
- A major engineering consulting firm in the thick of an emergency fuel-spill cleanup – managing the cleanup as well as the response to regulatory agencies and public concerns – needed the fastest possible test results report.
- A manufacturing company performing long-term, major remediation of contaminated soil and groundwater at multiple sites, with extensive investment in equipment and manpower, needed real-time data to expedite decision-making.
- Another manufacturer seeking to demonstrate contamination degradation in groundwater to a regulatory agency needed to accurately track changes over an extended period.

These scenarios are real and not uncommon. In each circumstance, the company was able to address its specific data management and reporting needs by utilizing a laboratory's advanced data management capabilities.

Perspective on lab data management

Predominant in lab data management are Laboratory Information Management Systems (LIMS), which are specifically designed for analytical laboratories serving such functions as R&D, in-process testing and quality assurance. A LIMS collects data from analytical instruments through a workstation, where the data is organized into meaningful information. This information is further sorted and organized into various report formats based upon the type of report required.

Originally developed in-house by labs seeking to streamline their data gathering and reporting processes, these systems have evolved over the past 25 years. Today, a full featured LIMS will manage lab data across the entire testing process – from sample login through final results reporting. The choices for companies seeking laboratory data management can be daunting. In-house LIMS still are being developed, but the process can take considerable time and resources to implement. Custom-built solutions can be designed by independent systems developers to run in specific laboratories,



The photo above is an example of the opening screen for the proprietary LabLinkSM online data management service from Accutest Laboratory.

but these often are cost-prohibitive for many companies.

While commercially available LIMS products have improved in the past decade, these products still can require customization to meet a specific laboratory's needs. In addition, depending on the analyses and reporting required, the level of user knowledge and time needed for self-configuration of the system can increase implementation time.

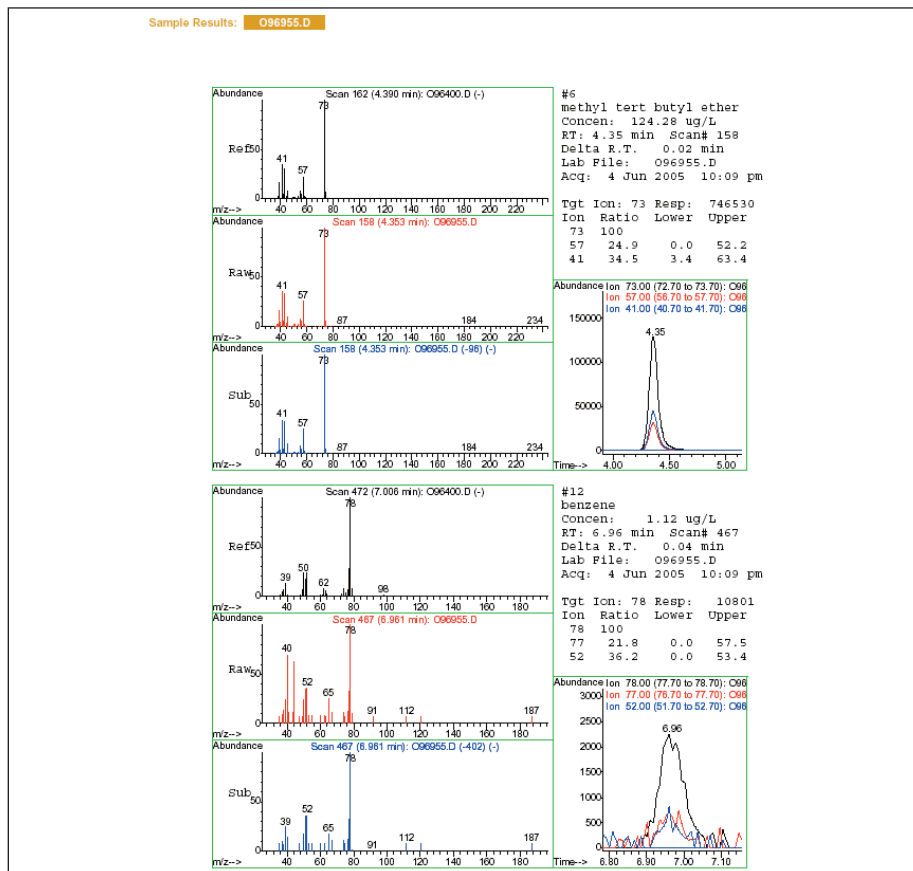
For engineering or consulting companies seeking to avoid the cost of developing their own electronic environmental laboratory management program or retrofitting commercial products to meet their needs, an independent testing laboratory that offers dynamic data management services is an effective alternative.

Data management built on experience

Specialized labs such as Accutest, Dayton, N.J., have their own standardized LIMS tool at the center of their operations, tracking virtually every phase from sample receipt to sample disposal. Their system, based on an Oracle relational database, resides at all of their locations on servers sized to meet demands for workload, capacity and data services. The lab has developed an online data management service exclusively for use by its clients, a proprietary system called LabLinkSM.

End-to-end access to all of a client's data

The system's capabilities are provided to their clients at no additional charge as a standard part of the company's analytical data services. Beginning the moment samples are received, the program provides a client with constantly updated job information and historical data, accessible over the Internet. No IT support is needed at the end-users' facility. Features are designed to help save time as clients navigate the complexities of their environmental testing and reporting.



Many of the default features are user-configurable to fine tune the system and customize information access as demonstrated above.

For instance:

- *Automated sample receipt confirmation* allows a user to quickly confirm that samples are properly logged in the LIMS, and ensures that requested tests, sample IDs, turn-around-times, etc., are correct.
- *Chain of custody documents* are scanned into PDF files and available online.
- *Complete status information* enables users to track the progress of job, sample and test information, including access to status information in real time.
- *Immediate access to test results* the moment they are approved by the laboratory; the user does not need to wait for a phone call or fax to confirm results. The system's data query options allow the user to access specific data (such as only hits). Results also can be automatically compared with a variety of state and federal regulatory limits.

- *Quality control data* is accessible online, allowing the user to click to view method-blank, MS/MSD, blank spike, surrogates, chromatograms, spectrograms and other raw data.
- *Historical data query* enables query options and sort criteria to be specified and executed in seconds, allowing the user to identify any trends.
- *eHardcopy reports* allow the user to specify projects of interest and automatically receive a fully interactive, navigable PDF report.
- *Billing information* allows the user to access preliminary billing information and check quote prices before invoice delivery. In addition, historical billing information is maintained, allowing up-to-the-minute project financial summaries. Final invoices also can be downloaded in PDF format.

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Data delivery and format options

The lab offers a variety of data formats, producing custom deliverables and electronic data interchange. For accuracy and consistency, all reports are automatically generated, so that all data flows from the same database and there is no manual report integration.

In addition to providing comprehensive hard-copy reports, the lab provides electronic data deliverables (EDDs) for integration of LIMS data into the end client's final report and database. Depending on the client's specifications, EDDs are routinely produced in electronic formats including:

- Commercial database import
- Custom database import
- Custom spreadsheet reports
- State and federal regulatory EDDs
- Standard crosstab reports

The system allows a client to go online and use tools within the LIMS to generate EDDs on demand.

Clients also can utilize online report access to request and upload result reports that are identical to hard-copy reports. The uploaded reports then can be printed locally from a PC.

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As a replacement for paper reports, the lab offers a completely automated electronic technical report format called e-Hardcopy. Finished data is generated in a navigable PDF format, which includes a signed cover page, chain of custody and comprehensive quality control support data. These reports can be automatically delivered via e-mail or generated on demand.

With the exception of the original chain of custody and some handwritten bench logs, electronic reports contain few scanned images and are structured documents, making them compact in size. Most electronic reports are small enough to send via e-mail and, unlike a scanned document, they produce a quality first-generation printout.

Electronic report generation is automated and all data is included. Because the report is a live PDF, it includes a variety of features to help navigate through the data:

- Table of contents and section markers for jumping from the contents to any section or subsection or back with a single click
- Clickable bookmarks for drilling down to details
- Smart links for jumping from reports to raw data or back (e.g., viewing sample results, clicking to view associated chromatogram, then clicking to return to the results)
- Raw data graphics stored in original vector form, for zooming in to view peaks and baselines

Data for real-world scenarios

The engineering consulting company responding to an emergency fuel spill was able to jumpstart and maintain its cleanup project by utilizing the system's features to view sample analysis data available within 12 hours of sample collection. Samples were analyzed seven days a week, and the client's EDDs were expeditiously available to regulatory agencies and consultants handling public relations with the media. The client has continued to monitor groundwater results, using the system to view historical data to monitor the extent of groundwater contamination.

For the manufacturer performing long-term remediation of contaminated soil and groundwater at multiple sites, data obtained in real time enabled managers to make immediate decisions in the deployment of equipment and manpower. The client was able to compare results against state-specific regulatory criteria to identify hot spots and delineate the area of contamination.

And for the manufacturer seeking to demonstrate contamination degradation in the groundwater, samples were collected monthly over a five-year period, and the client was able to review historical data and identify a downward trend. The company then used the generated reports to present data to the regulatory agency to get a decrease in sample frequency.



For more information, visit www.accutest.com.