Managing lab data

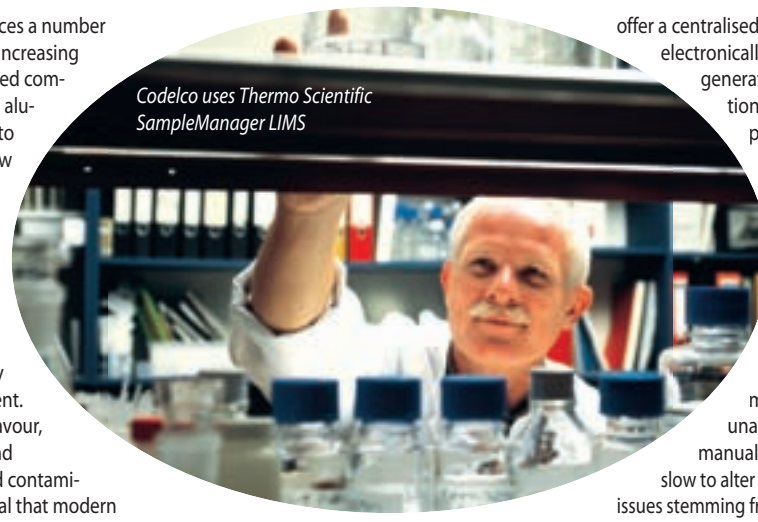
Colin Thurston at Thermo Fisher Scientific looks at the applications and benefits of laboratory information-management systems in modern mining

TODAY'S mining industry faces a number of pressures with the ever-increasing demand for mined-ore based commodities such as zinc, lead, aluminium, silver and copper to provide global companies with the raw materials necessary for manufacturing the end-products essential for modern-day living.

This, combined with a growing economic and political climate for investment in remote parts of the world, has driven the mining industry to excavate areas that were previously inaccessible to large-scale development. With mining already a high-risk endeavour, where the measurement of human and environmental exposure to toxins and contaminants must be monitored, it is essential that modern mining operations are equipped with the tools to help them manage and monitor their internal and external processes effectively.

In order to assure the quality/certification of products, optimise the efficiency and throughput of continuous processes, and comply with industry, international or governmental product and safety standards, the modern mine must control its processes with rigorous testing and real-time monitoring.

Laboratory Information Management Systems (LIMS) are a key components in the day-to-day management of a modern mine; not only to provide increased productivity, but also to help operations comply with the myriad of regulatory requirements related to everything from documentation and instrument calibration to environmental monitoring.



Codelco uses Thermo Scientific SampleManager LIMS

REGULATORY ENVIRONMENT

There are several critical areas of compliance for any mining operation, including security, instrumentation calibration, maintenance of electronic records, traceability of procedures, personnel, environmental and equipment monitoring. The ability of laboratory managers to have control of this vital information is an important aspect of the mining operation and ensures production can continue uninterrupted by any changes related to personnel or by equipment that falls out of calibration or is damaged.

Most modern mines are governed by local and international regulatory requirements. Common to all large process industries is Good Laboratory Practice (GLP). It requires companies to conform to a number of external regulatory disciplines, including ISO 9000, which establishes a standard for the quality process in any manufacturing or laboratory environment. Additional releases of ISO standards, also falling under GLP guidelines, relate to environmental monitoring (ISO 14000) and the latest, ISO 17025, regulates testing and calibration laboratories, which directly affects any major mining operation.

Being able to electronically manage the data produced in a mine's laboratory, in addition to managing the ongoing recalibration processes for key instrumentation, will greatly improve the functionality of the lab and provide lab managers with the validated documentation necessary for compliance with any local or governmental regulations, as well as ISO and GLP requirements.

MANAGING DATA – THE ROLE OF LIMS

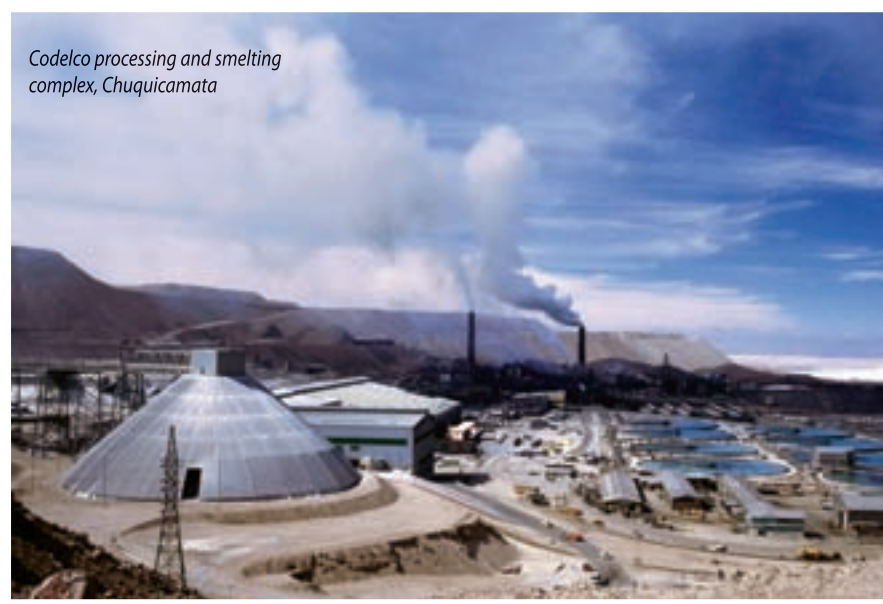
Laboratory Information Management Systems (LIMS) offer a centralised, data-management system to electronically access and share data being generated by the laboratory's instrumentation, enabling more efficient and productive management of the lab and its personnel.

In some mining laboratories, manual processes are still the norm for collating information and preparing reports related to product quality, production output and environmental analysis.

Time spent preparing these manual reports, added to the unavoidable error factor on the part of manual work, can render the laboratory too slow to alter processes or respond to compliance issues stemming from out-of-calibration instruments or equipment. A LIMS can offer time and cost savings, and help laboratory managers to increase productivity, thereby contributing to the overall financial position of the mine.

A LIMS installed in a modern mining operation will support automated reports and information analysis that are used in production-management decision-making for process and product quality.

Modern LIMS support existing enterprise Quality Control systems, such as SAP or Oracle, and can interface to other ERPs (enterprise resource-planning systems) across the organisation, as appropriate, such as MES (manufacturing execution systems) and PIMS (process information-management systems).



Codelco processing and smelting complex, Chuquicamata

Coal storage tower

THERMO FISHER LIMS SOLUTIONS

Thermo Fisher Scientific provides LIMS solutions to the mining industry and has an unmatched record of delivering high-output software that is purpose-built for each industry's specific requirements.

As many of the ISO 17025 requirements relate to the documentation of testing and calibration of instrumentation in a mining operation, Thermo Scientific SampleManager LIMS has built-in functionality for incident management and statistical analysis of both calibration standards and sample results.

Full audit-trail facilities are standard for SampleManager LIMS, allowing full traceability of the personnel and procedures conducted. These built-in capabilities allow laboratories to easily review their quality system by having ready access to all incidents, corrective actions, non-conforming results and other events.

Additional technical requirements of the ISO 17025 standard relate to the environment. Market-leading LIMS like Thermo Scientific SampleManager have a built-in functionality that handles environmental monitoring; a critical component of the laboratory's compliance with GLP and ISO 17025.

Environmental monitoring of key areas of the laboratory can be scheduled on a routine basis, monitored within the LIMS, and reported on a regular basis with a fully-validated audit trail of all procedures and personnel. Reliance on manual processes can be reduced or eliminated by the installation of a LIMS in the mining laboratory.

By automating their processes, laboratories approach real-time access to accurate data, avoid manual errors, and achieve the best control of samples, methods and results, saving personnel both time and cost as a result.

Thermo Fisher Scientific has worked with leading mining companies, implementing enterprise-wide deployments of its flagship Thermo Scientific SampleManager LIMS with the aim of reducing costs and increasing productivity, while ensuring optimum product quality and regulatory compliance.

Codelco chose Thermo Scientific SampleManager LIMS for its Chuquicamata facility, and installed it in its laboratory and at several remote sampling sites. Minera San Cristobal in Bolivia also uses Thermo Scientific SampleManager LIMS for its lab automation where ISO 17025 requirements related to instrument calibration and environmental monitoring are managed electronically. Rio Tinto also uses SampleManager as an integral part of its automated laboratory operations.

For mines in South Africa, Australia, the Ukraine, Canada, and other locations around the world, Thermo Scientific SampleManager LIMS has become a cornerstone of laboratory operations, ensuring continuous operations and regulatory compliance.

SampleManager's full client/server configuration, as well as the system's flexibility and interactivity, provide mining operations with the automated data and instrument-management tools necessary to keep pace with production, maintain margins and remain compliant with regulatory requirements.

SampleManager LIMS is also flexible enough to be configured to each laboratory's functions and provide information in a format required by both upstream customers and management.

> "The future of mining depends on the industry's capacity to maintain a balance between profitability and preservation of new, secluded environments"

BENEFITS OF LIMS IN MINING

The future of mining depends on the industry's capacity to maintain a balance between profitability and preservation of new, secluded environments. Human capital also needs to be protected, both on-site and in the surrounding communities, where measurement of human and environmental exposure must be monitored. This requires risk assessment at all stages to ensure any affects on the environment and people are always understood.

Laboratory Information Management Systems address these requirements, serving as a tool to manage mining data, which enables laboratory and mining operations managers to obtain faster results, improved efficiencies, increased margins and certification of the end product. An automated information-management system can ensure documented and validated regulatory compliance with the many requirements imposed on the industry.

A LIMS can provide the audit trail to assure those regulatory authorities that the company's mining activities have no negative impact on the environment. Modern mining operations will realise these benefits and deliver increased value to their shareholders when they automate their laboratories with world-class LIMS.

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