

## Case study

# Transitioning to digital workflows to power lithium production

Albemarle Corporation is a global specialty chemicals company that develops, manufactures, and markets lithium, bromine, catalytic refining solutions, and other products used in various industries. The company is a leader in the transformation of essential resources into critical ingredients for mobility, energy, connectivity, and health.

Albemarle is a key player in lithium production. The company's Chilean operations, in particular, focus on the production and export of lithium, a key component in the manufacture of batteries used in electric vehicles and electronic devices.

In Chile, the company sought to standardize laboratory QA processes and enhance traceability throughout their workflows. To do so, they partnered with Thermo Fisher Scientific to implement a Laboratory Information Management System (LIMS).

**Implementation reduced errors, improved data integrity, eased compliance, and decreased time spent on data entry by 30%.**

## Background

Albemarle's chemical conversion plant in La Negra, located in Antofagasta, Chile, is significant to the company's global operations. This plant specializes in the production of Technical grade and battery grade Lithium carbonate.

The plant utilizes a highly advanced chemical conversion process to transform lithium concentrates into high-purity lithium chemicals. This conversion process includes leaching, purification, precipitation, and drying to produce high-quality lithium products.

The plant is equipped with state-of-the-art technology and adheres to strict environmental and safety standards. The facility operates under sustainable practices, implementing measures to minimize its environmental impact, such as water and energy conservation, waste management, and emissions control.

With its strategic location in Antofagasta, the plant benefits from the region's rich lithium resources and well-established transportation infrastructure, allowing for efficient supply chain management and global distribution of its lithium chemicals. It creates lithium carbonate using raw materials and natural high salt-content brines extracted from salt flats in Atacama.

Overall, Albemarle's chemical conversion plant in La Negra plays a vital role in meeting the growing global demand for lithium chemicals. It supports the development of sustainable energy solutions and the advancement of various industries reliant on lithium-ion batteries, including technology giants producing lithium-ion batteries, the glass industry, and electric vehicle manufacturers.

## Albemarle's laboratory workflows

In the production of lithium carbonate, the La Negra plant has to manage several key lab processes.

The intricate production process places emphasis on quality control and the characterization of raw materials. Parameters, such as density, metal concentration, and conductivity are rigorously monitored to ensure the production of high-quality battery-grade lithium carbonate. In this dynamic and demanding environment, Thermo Scientific™ SampleManager™ LIMS plays a pivotal role in orchestrating the scheduling and management of important activities such as sampling and chemical-physical analyses. Its functionality extends to securing traceability, helping the organization adhere to the standards of good laboratory practices required in the industry.

SampleManager LIMS is instrumental in driving the digitization and automation of critical processes. Beyond its role in the laboratory, the system enables integration with SAP, facilitating the generation of certificates of analysis. This integration not only expedites the certification process, but also supports the organization's commitment to compliance with ISO 17025 standards, ensuring that the end products align with the highest international benchmarks.

### Before SampleManager LIMS

Before using SampleManager software, Albemarle relied on manual spreadsheets for data entry, calculations, and result tracking. The various laboratories used different forms and formulas, creating disparate and potentially confusing data.

Although they were able to standardize processes and formulas somewhat, they still needed a system that didn't rely on so much manual effort. Manual workflows were time-consuming, and manual data transcription introduced errors that raised concerns about data integrity. Data transfer delays and potential integrity issues also occurred when integrating with SAP-QM without a LIMS.

The new system would need to support the transition of existing information, which would involve collecting and validating master data, as well as providing the option for historical data transfer.



### Choosing and implementing a LIMS

The process of selecting the right system for the La Negra plant involved many stakeholders from the company. When the need for a LIMS was identified, Albemarle implemented multiple laboratory systems across the company. The team in Chile investigated the various systems used in the organization at a global level to determine which they should standardize. Following a complete evaluation, taking into account the overall requirements across the laboratory network, and the evaluation of solution capabilities and performance, the team selected Thermo Scientific SampleManager LIMS software. Shortly after the selection process, Albemarle assigned a global LIMS team to implement SampleManager software across the organization. The decision was based on its integration power and ease of creating forms and generating reports.

The LIMS addresses challenges in the plant by automating communication between the logistics function and the laboratories, ensuring bidirectional error-free data transfer, and enabling faster, more informed decisions around production quality. In addition, the features, ease of use, and integration capabilities of SampleManager software contribute to significant time savings, improved data accuracy, and enhanced productivity.

SampleManager LIMS seamlessly integrates with SAP HANA, Albemarle's Plant Information System, and their NWA solution used for statistics and analytics. These integrations enhance data accessibility, real-time analysis, and statistical control. The organization has plans to incorporate advanced data analytics, including artificial intelligence (AI), into predictive modeling and decision support. Having all production and laboratory data accessible will enable more holistic analysis.



During the implementation project, the master data was collected and validated to load into LIMS in the formats required. SampleManager LIMS has a native ETL tool that facilitates the extraction, transformation, and loading of master data and business rules for the laboratory, easing the installation process to achieve a faster go-live.

SampleManager LIMS plays a crucial role in scheduling and managing sampling, chemical-physical analyses, and ensuring traceability of samples and data, which supports data integrity and helps the site meet good laboratory practice standards. The system aids in classification, digitization, and automation of processes, facilitating integration with SAP for certificate generation and enabling compliance with ISO 17025 requirements.

At the La Negra plant, LIMS is used in the quality control laboratories by QC analysts and plant operation staff to plan sampling programs and visualize results online. The dynamic results dashboards are viewed by the operational excellence team that seeks to improve efficiencies and effectiveness of the laboratory and the plants. Thanks to SampleManager software, the entire plant has visibility of the laboratory data with the ability to see trends and statistics and track Key Performance Indicators (KPIs).

“The automation achieved with SampleManager software had a great impact on the company mainly in the receipt of samples, the ability to view laboratory data, and generate reports and certificates in the sites that have implemented the system.”

—Hans Allende, LIMS Application Leader  
North & South America

Implementing SampleManager software reduced errors, improved data integrity, eased compliance with ISO 17025 standards, and decreased time spent on data entry by 30%. The LIMS supports sustainability initiatives and is part of the expansion plans for analytical excellence and lithium extraction areas.

The raw materials for the La Negra plant come from another Albemarle site in Chile, El Salar, where they are also implementing SampleManager LIMS. The raw material is brined at El Salar and sent to La Negra to generate the finished product.

### SampleManager LIMS integrations

Albemarle's processes require integrated systems to connect critical production and lab testing data. The company's successful adoption of SampleManager LIMS is not limited to its standalone capabilities. The seamless integration with other systems like, SAP, plays a pivotal role in optimizing workflows, enhancing data accuracy, and supporting real-time decision-making.

These integrations are key in the timely identification of process modification requirements to avoid non-compliance or out-of-specification product. For example, if results are automatically sent back to LIMS from an instrument, an out-of-spec result can be flagged and trigger an email to inform the plant to make the correction.



### Future deployments and expansions

The successful implementation of SampleManager LIMS has already delivered tangible benefits to Albemarle, including significant time savings, enhanced data accuracy, and streamlined operations. Real-time monitoring, automated alerts, and seamless integration with mining systems and SAP-QM have collectively contributed to operational excellence.

The positive impact extends beyond efficiency gains. Compliance with ISO 17025 standards, automated certificate generation, and improved quality control demonstrate the system's effectiveness in meeting rigorous industry requirements. The adaptability and flexibility of SampleManager LIMS have empowered Albemarle to evolve its workflows, transitioning from manual processes and spreadsheets to a digitized and interconnected software ecosystem.

Albemarle plans to expand the LIMS in La Negra, focusing on the analytical excellence and lithium extraction areas. Integration with a weather station for data comparison and prediction modeling is also under consideration.

Albemarle's implementation of SampleManager LIMS has proven to be a positive strategic move, streamlining processes, enhancing data quality, and supporting the company's growth and sustainability objectives. The LIMS has become an integral part of Albemarle's operations, facilitating efficient workflows, and providing valuable insights for decision-making across various departments.

The organization not only navigates the complexities of lithium production with precision, but also fortifies its position as a reliable supplier to industries at the forefront of technological advancements through its strategic utilization of SampleManager software. The synergy between cutting-edge technology and meticulous process management underscores Albemarle's commitment to delivering excellence in the competitive landscape of lithium production.

 Learn more at [thermofisher.com/digitalscience](https://thermofisher.com/digitalscience)