

Water/steam cycle audits, and follow-up audits

Identifying areas for improvement and assessing progress

ENSURING THE RELIABILITY OF INSTALLATIONS AND PROCESSES

About 30% of power plants suffer a major chemistry-related incident within ten years of operation. Based on returns on experience in the market, such a major incident can cost up to 4 million euros in operation and maintenance costs and capital expenditures. In order to avoid these expensive incidents, plants need to carefully control water/steam cycle activities, with the appropriate level of expertise and adapted resources. Through chemistry audits, and then follow-up audits, Laborelec is able to reduce the risk of a chemistry-related incident by 30 to 50 percent.

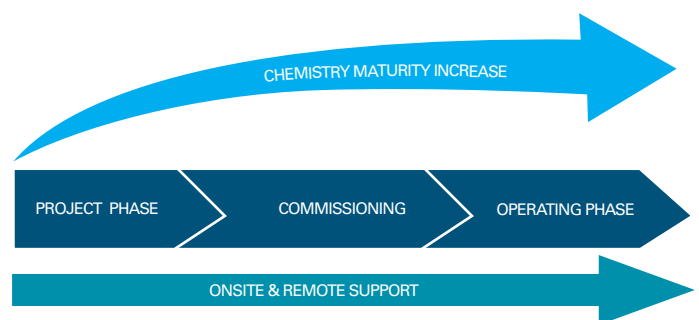
EXTERNAL EXPERTISE INCREASES COST EFFICIENCY AND AVAILABILITY

Our independent teams of experts rely on effective audit methods to identify areas for improvement and devise an action plan. A year after our first audit, we conduct a follow-up audit to assess the progress of the action plan implementation and identify new improvement opportunities. In this way, we help achieve the following benefits:

- > **Reduce operation and maintenance costs**
Our initial and follow-up audits help decrease the risk of a major chemistry-related incident by as much as 50 percent. Based on the return on experience within the GDF SUEZ Group, the audits can help save 60,000 euros-worth of costs per year by reducing the risk of incidents.
- > **Improve availability and safety**
The early identification of issues enables plants to reduce the risk and impact of chemistry-related incidents, thereby increasing the plant's availability and enhancing its safety. We focus on verifying the safety of the analyzers' immediate surroundings and on chemical product disposal, among other aspects.
- > **Increase process efficiency**
Based on our analysis of the organization and its processes, we offer advice to improve process efficiency. We help achieve this by optimizing the purity control and treatment procedures, among other things.

- > **Ensure effective improvements**
The improvement opportunities identified during our initial audit are concretized in an action plan. In follow-up audits, we monitor the implementation of the action plan and screen for new areas for improvement.
- > **Independent expert review ensures compliance with best practices**
Our independence ensures that our advice will serve the plant's best interests. Our vast experience in providing chemistry services to a wide variety of power plants worldwide enables us to incorporate in-house and international best practices.

WATER/STEAM CYCLE CHEMISTRY SERVICES



Laborelec is active in every step of the water/steam cycle value chain. This leaflet focuses on our activities during the commissioning phase, more specifically the onsite audit.

INTERNATIONAL REFERENCES

- > Laborelec has audited water/steam cycle chemistry in the Middle East, Singapore, Turkey, Ireland, Chile, Panama, Poland, Italy, France, Belgium, Greece, Hungary, Germany, etc.

Comprehensive technical and organizational screening

Chemistry audits can be proactively planned, or they can be the result of a root cause analysis of a plant incident. Laborelec's audit methods evaluate the organization's chemistry maturity. Our experts identify areas for improvement in water/steam cycle processes, help develop an action plan, and carry out a follow-up audit to assess the progress the action plan implementation.

INITIAL ASSESSMENT OF THE ORGANIZATION AND ITS PROCESSES

Our experts typically begin the audit with a short onsite assessment (lasting two to three days), in order to fully understand the specificities of the organization and its processes. We then review the entire design of the water/steam cycle, from the process and instrumentation diagram (P&ID) to the types of condensers used and equipment materials.

DETAILED CHEMISTRY REVIEW

Our experts' review focuses on various aspects:

- Evaluation of the water/steam cycle treatment and the purity control
- Development of a customized monitoring program: sample points, chemistry parameters to follow online and/or manually, specifications
- Evaluation of manual analysis procedures and the online chemistry analyzers' operational safety and compliance with plant requirements
- Assessment of equipment, such as dosing and control command installations, in collaboration with the local operators

At this stage, we also provide coaching tailored to the specific needs of the plant. In addition, our experts analyze the chemistry analyzer data from the past few months and benchmark them against both in-house and international best practices.

ONSITE PRESENTATION OF STRENGTH AND WEAKNESSES

After the onsite audit, we present our findings to local technicians, operators, and management. We focus on both the strong and weak points of the water/steam cycle processes.

ACTION PLAN DEVELOPMENT AND ROLLOUT

Based on the identification of areas for improvement, we create a detailed action plan. Our recommendations include a full monitoring program with guidance values and specific targets.

FIVE REASONS FOR YOU TO CHOOSE LABORELEC:

- > Wide range of technical competences in Electricity Generation, Grids, and End-Use
- > Increased profitability and sustainability of your energy processes and assets
- > Unique combination of contract research and operational assistance
- > Independent advice based on certified laboratory and field analyses all over the world
- > More than 50 years of experience

CONTACT

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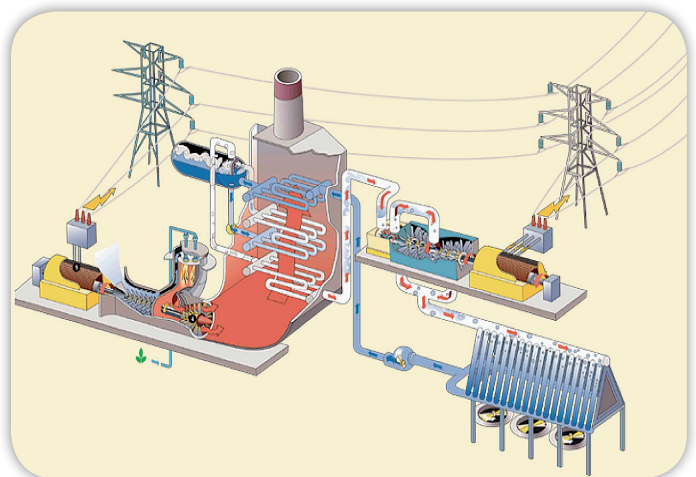
FOLLOW-UP AUDIT

A year after the initial rollout of the action plan, our experts conduct a follow-up audit to assess the progress of its implementation and analyze chemistry-related activities in further detail. As new technologies and methodologies on the market are continuously emerging and evolving, this follow-up audit also gives us the opportunity to identify new potential improvement opportunities.

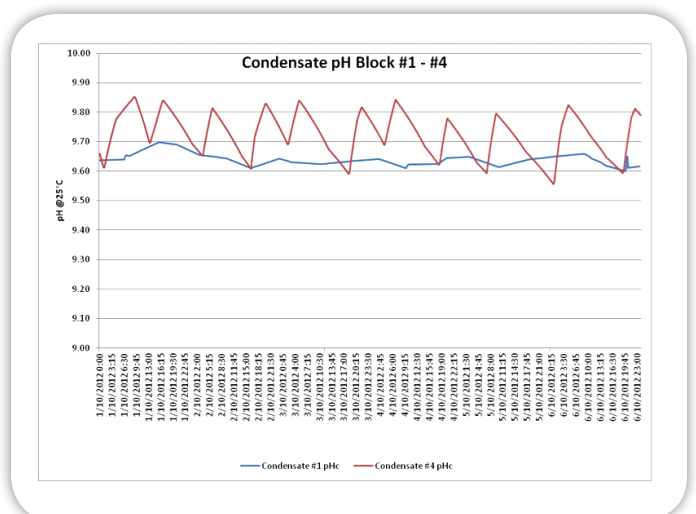
ADDITIONAL SERVICES

Laborelec offers various additional support services:

- Carryover tests to ensure that the steam quality matches the supplier's contract requirements
- Analysis of cycling's impact on chemistry activities
- Root cause analysis of boiler tube failures
- Advice on conservation during shutdown
- Specialized training sessions for plant operators and chemists



Our independent experts audit the plant's organization and water/steam cycle in order to identify areas for process efficiency improvement.



4 is manual dosing, 1 is automated dosing

