



From water treatment to water reuse, and from solidification and stabilization to moisture recovery, we partner with clients to transform how water is used.

Water scarcity and increasingly stringent regulations mean conventional approaches to treat, reclaim, and reuse water are not enough. As water impacts our clients like never before, they demand water reuse and treatment strategies that meet requirements without negatively impacting their operation. With no one-size-fits-all solution, we partner with industrial and government clients to develop customized solutions tailored specifically to their needs.





Our Services

Our team of industry experts have deep experience in servicing the electric power, oil and gas, mining, and manufacturing sectors. We also have experience with a wide range of new technologies. By combining this technology expertise with understanding of plant operations, we provide clients with a unique blend of services. From operating industrial plant laboratories to monitoring process water quality to developing, implementing and operating a wastewater treatment solution at a power plant, SR is a leader in developing innovative industrial water reuse and treatment solutions. Our services include the following:

■ **Industrial Water Engineering Services**

We complete lab and site validation of new processes and equipment in our facilities, and at client locations, by field testing and verifying critical process technologies. The results from these evaluations provide the information required to develop conceptual, basic, or detailed engineering designs performed by SR or one of our partner firms. These technology evaluations occur at every scale—from bench-scale to pilot-scale all the way to full-scale commissioning work. We support this work with a full complement of analytical laboratory testing services. Key to our success is our independent, unbiased approach to technology selection. We are not a technology or chemical supplier, and so, our recommended solution has the client's best interests in mind.

■ **Development of New Processes or Technologies**

We develop our own patented technologies that are available for licensing, and we partner with clients to develop new technologies to solve pressing water issues. In these circumstances, funding can originate from the client, SR, an external funding source or all of these entities.

■ **Consulting Services**

We work with clients on technology due diligence and techno-economic analysis by objectively assessing water technologies on paper and in practice. We also provide technical and engineering support throughout the technology water development process.

■ **Laboratory Services**

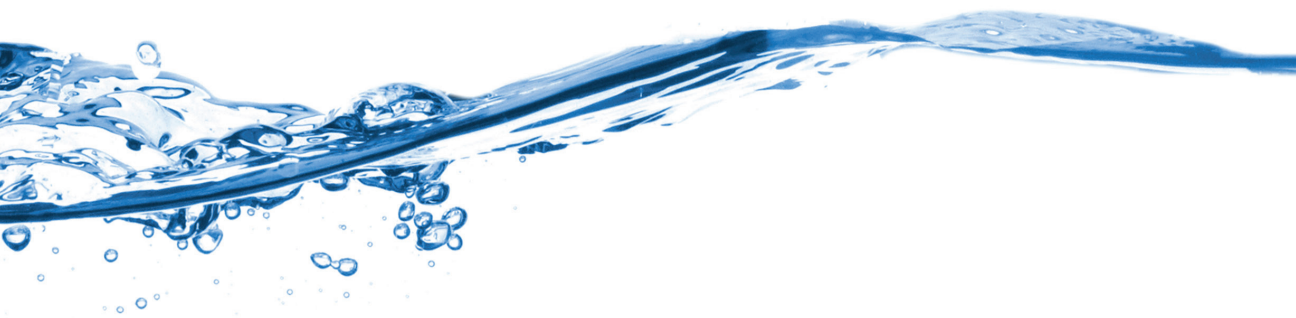
The Southern Research industrial water analytical laboratory is a leading environmental testing laboratory. Through continued investment in staff, instrumentation, and data management solutions, Southern Research is able to provide world-class service to its commercial and government clients. SR provides comprehensive analytical lab services:

1. Laboratory analytical testing
2. Field sampling services
3. Field analytical services
4. Method Development
5. Scientific staffing of labs
6. Specialty environmental leaching testing

■ **Process Streams**

SR has access to various wastewaters, including FGD wastewaters, ash handling streams, equipment wash waters, low volume waste, cooling tower blowdown and circulating water. SR has the capability to manipulate water composition and synthesize wastewaters of compositions of interest to our clients. Further, SR has the capability to accept wastewater generated off-site, including wastewater from the oil and gas industry, chemical industry, mining, CO₂ sequestration, and auto manufacturing, among others. This unique access to process streams allows us to cost-effectively conduct bench treatment studies at a centralized, state-of-the-art facility.





Our Projects

SR got its start in industrial water by providing state-of-the-art analytical laboratory capabilities. Today our industrial water practice provides a wide range of services. Example projects completed for clients include:

■ *Operation of Plant Laboratory*

SR operates a chemical laboratory at a power plant site on behalf of the client. Our highly trained chemists staffed the laboratory and were able to immediately assume responsibility for conducting all of the field sampling and laboratory analysis required to ensure process streams were within specified limits. Our scientific staffing service allows clients to minimize headcount and focus their efforts on core business areas.

■ *Field Sampling Campaign and Characterization*

In order to begin the engineering conceptual design process, our industrial customers engage SR to collect field samples from wastewater streams to analyze for a wide range of analytes. Our team has experienced traveling across a multi-state region to collect, preserve, and analyze samples to create an extensive library of process stream data for clients. This library of data helped the client understand day-to-day and plant-to-plant variation in their wastewater streams and develop technology solutions that address that variability.

■ *Process Wash Water Evaluation*

In addition to large process wastewater streams, many industrial clients produce intermittent wastewater streams from operations such as equipment washing performed during outage periods. These wash waters contact process equipment that contain pollutants accumulated during operation, and so, must be characterized in order to identify how to manage its proper disposal.

SR has collected samples from plant washing operations, characterized their composition and recommended appropriate management of these waters for industrial clients.

■ *Water Research Center*

We have conducted extensive water-related research at the Water Research Center (WRC), a state-of-the-art facility located in Cartersville, GA, where we are responsible for scientific research, operations, business development and laboratory analysis. This work has included evaluating numerous technologies to help electric power sector clients address new regulations requiring them to treat process waters prior to discharge. As part of this work, we have evaluated many different technologies including physical-chemical-biological treatment, wetlands, thermal evaporation and crystallization, adsorption, and membranes (nanofiltration, forward-osmosis, reverse-osmosis, membrane distillation), among others.

■ *Deep Well Injection Scale Pre-treatment*

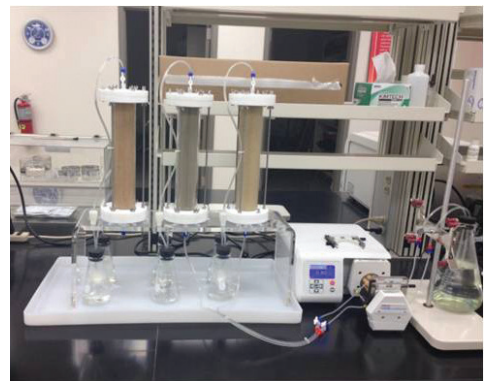
SR helped our client develop a cost-effective solution to its wastewater treatment scaling issue. Our client came to us to help develop a solution to a scaling issue associated with their deep well injection of process wastewater. Concerned over scaling of deep well injection piping, the client had engaged another firm, which had recommended a capital-intensive solution to minimize scale and preserve the integrity of the deep well piping. In order to reduce costs, our client asked us to develop alternative approaches. SR developed a unique chemical pre-treatment approach that resulted in significant savings for the client over alternative solutions provided by other firms.

■ *Solids Leaching Studies and Solidification*

Multiple clients have engaged SR to evaluate leaching from solids produced from various industrial plant processes that are managed in landfill storage operations. Our solids leaching work has included collecting solids samples from air pollution control and wastewater treatment processes (e.g. zero liquid discharge technology) and evaluating their leaching properties. These studies inform long-term landfill management storage decisions and were used to improve overall performance of landfill operations.

■ *Development of Ash Pond Treatment Solution*

SR was selected to develop a cost-effective wastewater treatment solution for a client retiring a coal fly ash pond. The client was in the process of retiring a coal fly ash pond but needed an interim wastewater treatment solution in order to maintain compliance during the transition of its operation. SR developed a concept to modify an existing pond and enhance treatment, which was significantly less expensive than renting treatment equipment for this interim period. SR conducted bench-scale tests used to develop a treatment solution at full-scale, which was successfully implemented, and today SR continues to operate this full-scale wastewater treatment process.



ABOUT SOUTHERN RESEARCH

Founded in 1941 in Birmingham, Alabama, Southern Research is a scientific and engineering research organization that conducts preclinical drug discovery and development, advanced engineering research in materials and systems development, and energy and environmental technologies research. SR supports clients and partners in the pharmaceutical, biotechnology, defense, aerospace, environmental, and energy industries.

We pursue entrepreneurial and collaborative initiatives to develop and maintain a pipeline of intellectual property and innovative technologies that contribute to the growth of the organization and positively impact real world problems.

www.SouthernResearch.org