



4. Continuous Circulation Drilling

Downhole Tool Cooling

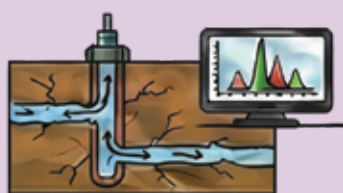
- ✓ Prevents thermal damage to downhole tools by continuous mud circulation during pipe connections
- ✓ Ensures continuous hole cleaning and cuttings transport
- ✓ Optimal temperature control, even in high-temperature wells
- ✓ Save costs by avoiding downhole tool damage, stuck pipe, and NPT



5. Fracture Detection While Drilling

Real-Time Fracture Detection

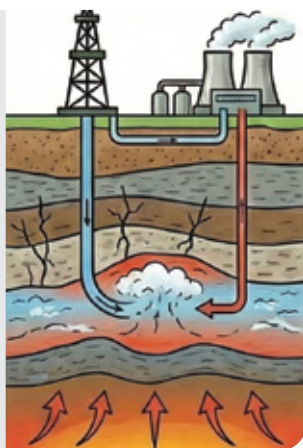
- ✓ Detect fractures while drilling
- ✓ Identify enhanced permeability and fluid flows
- ✓ Improve Enhanced Geothermal System (EGS) designs



Deliverable-Focused

Innovative

Reliable Geothermal Solutions



GEOLOGICAL TRACK RECORD



100+ Wells



12 Countries



25 Clients

Tailored Solutions for Every Project
Your Challenges. Our Expertise - from exploration to drilling to production

At GEOLOG, we understand that no two geothermal reservoirs are the same. Whether you are exploring a volcanic hydrothermal system or developing an Enhanced Geothermal System (EGS), we provide more than just off-the-shelf data. We pride ourselves on our ability to tailor our services to meet your specific operational requirements. From real-time gas monitoring to integrated laboratory rock and water analysis, our modular approach ensures you get the exact insights needed to reduce exploration risk and optimize reservoir performance.

Why Choose GEOLOG?

Precision: Detailed lithology, mineralogy, and hydrothermal alteration zone detection

Efficiency: Continuous circulation drilling solutions that eliminate NPT and protect downhole tools

Intuitive: targeted analyses that enable the calculation of geothermometers and allow for the reliable estimation of the reservoir temperature

Ready to Optimize Your Geothermal Project?
Let's build a solution that fits your needs.

Contact Our Experts



www.geolog.com

GEOLOGICAL EVALUATION SERVICES

High-Level Deliverables & Insights



GEOLOG



1. Cuttings & Core Chip Analysis

Subsurface Geologic Insights

- ✓ Digitization of samples with detailed lithological and mineralogical analyses
- ✓ Detection of hydrothermal alteration zones using geothermometers
- ✓ Quantitative characterization of the different types of scaling



2. Water Characterization

Reservoir Fluid Properties

- ✓ Analysis of bulk properties of liquids (e.g., pH, conductivity, alkalinity)
- ✓ Identify major, minor ions and trace elements
- ✓ Isotope characterization of water samples ($\delta^2\text{H}$, $\delta^{18}\text{O}$)



3. Mud Gas Analysis

Real-Time Gas Monitoring

- ✓ Continuous detection of C1-C5 hydrocarbon gases
- ✓ Identify He , H_2 , CO_2 , and H_2S gases
- ✓ Safety observation of well conditions while drilling



Case Study: Geothermal System Evaluation

Challenges

To reduce geothermal exploration risk, assess the presence of an active and potentially commercially exploitable geothermal system, and provide estimates of reservoir temperatures.

Solution

To characterize the hydrothermal system, rock and water samples were analyzed at the Geolog laboratories. The rocks were studied using XRF and XRD analyses to determine their chemical and mineralogical composition, while the water samples were subjected to a series of analyses to

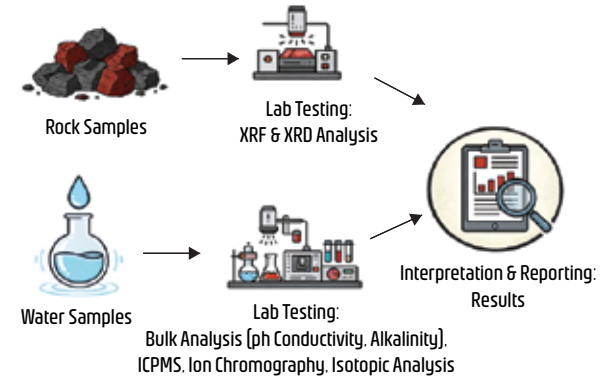
measure physical parameters, major, minor, and trace elements, as well as their $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotopic composition.

Value

Combining rock analysis with water analysis in the laboratory allows us to obtain an estimate of reservoir temperatures and to highlight the geothermal potential of a specific area without drilling any wells.

Results

In this case study, rock analyses showed a predominance of plagioclase (70-90%) and evidence of an evolved basaltic-andesitic magma, likely derived from a single magma chamber. Water analyses, combined with geothermal calculations, identified low- (60-90°C) and medium-temperature (100-150°C) reservoirs, highlighting the area's geothermal potential and distinguishing waters affected by high-temperature interactions from those circulating in the more peripheral zones of the system.



An evaluation of a geothermal system's potential utilizing an integrated approach from laboratory rock and water analyses.

12 rocks from multiple locations were analyzed

The results showed they were dominated by plagioclase, indicating that the area likely originates from a single magma chamber, which represents a concentrated heat source and promotes:

- A relatively stable hydrothermal system
- Direct fluid paths and efficient heat transfer to overlying reservoirs
- Greater geothermal potential and likelihood of commercially exploitable deposits

10 Water samples were analyzed

The calculations of the Na/K and SiO_2 geothermometers determined different enthalpic potentials within the same field.

Location	Type	Enthalpy
1	Lake water	Low
2	Groundwater	Low
3	Drain Channels	Low
4	Resurgence Areas	Low
5	Hot and Cold spring	Low - Medium
6	Thermal lake	Medium- High
7	Hot pool	Medium- High
8	Production waters	Medium- High

Mineral Distribution

