

## **Geothermal Water Analysis**

### **Geothermal Well Testing**

Bakker Oilfield Supply Coevorden B.V., KIT and gec-co GmbH are providing a high quality in-situ service for Geothermal Well Testing, based on a German research project to improve the thermal output and the economic viability of your power plant. The mobile measuring unit ensures a valid description and analysis of the thermo-physical properties during well test, especially at temperatures up to 170 °C, pressures up to 26 bars as well as a salinity of up to 250 g/l.

Currently available numerical models describing the thermo-physical properties are typically not valid for the conditions in geothermal applications and do not consider the substantial influence of the chemical composition of the thermal water. In order to determine the dependency of the thermo-physical properties of geothermal water on temperature, pressure, salinity and gas content, the in-situ measurement device is designed to meet a wide range of geothermal fluids present in Central Europe.

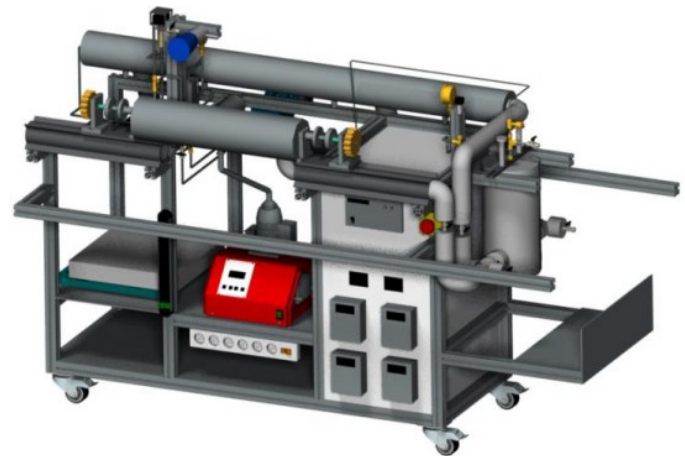
In-situ measured parameters:

- specific isobaric heat capacity
- kinematic viscosity
- density

as well as

- thermal conductivity
- pH

In addition, measured data can be used as reference data for developing and validating numerical models. The thermo-physical properties have been measured as functions of the geothermal water temperature, pressure and salinity at several sites in Germany.



*Courtesy of gec-co GmbH*

The measurements show that the thermo-physical properties correlate strongly with the salinity and therefore differ considerably from pure water values when a significant salt content is present.

### **Bakker Oilfield Supply Coevorden B.V., exclusive partner for in-situ Water Monitoring Services in the Netherlands.**

Bakker Oilfield Supply Coevorden B.V., KIT and gec-co formed an official partnership regarding field services in the Netherlands. Bakker Oilfield Supply Coevorden B.V. is therefore able to offer you this new and impressive Water Monitoring Service.

One of the great advantages of this innovation is, that the analysis can be performed in the very early stage of the development of your geothermal well. This means on site, during the well test! Taking a sample, sending it to a laboratory and waiting for the results, belongs to the past!





# Bakker Groep Coevorden

**Bakker Oilfield Supply Coevorden B.V.**

In-situ measured parameters ensure that there are no changes in pressure, temperature as well as chemical composition including gas content of the brine. Degassing and thus precipitation of salt components during sample collection can be avoided.

The water from the newly drilled well can be analyzed at the spot, without disrupting the well test. Our novel measuring unit will provide instantaneously the most accurate data possible, regarding the physical properties of the geothermal water from your well.

This innovation enables you to immediately compare in-situ data - on site - with the existing models used during the calculations for the development of your geothermal plant. In case the in-situ measured parameters show you differences compared to the used models during your calculations, this innovative tool enables you to make the required changes in your set up in the earliest possible stage of the project.

To help improving the efficiency of your facility, measurements can also be executed in existing power plants, without any disturbance or negative effects on plant operation. You will not even realize that we are measuring! Natural changes of your well can be easily detected. The results can be compared to your original data base and necessary modifications can be implemented to improve heat and power output.

## **In-situ-measured water parameters are your insurance for the future performance of your geothermal well and the efficiency of your plant.**

The in-situ measurement is a collaborative project between Bakker Oilfield Supply Coevorden B.V., Karlsruhe Institute of Technology (KIT) and gec-co Global Engineering & Consulting-Company GmbH (gec-co).

Bakker Oilfield Supply Coevorden B.V. provides Water Monitoring Services exclusively in the Netherlands and supplies any additional required equipment to support in-situ measurements on site. The Water Monitoring Services can be combined with the Geothermal Well Testing Services Bakker Oilfield Supply Coevorden B.V. provides.

KIT initiated the project, developed suitable instruments and set up the mobile measuring unit, performs comprehensive test series on-site and in laboratory as well as analysis and documentation of the measuring campaigns.

gec-co delivers engineering services regarding the development of the measuring devices, conceptualizes and evaluates the improvements regarding a practice-oriented implementation and supports the R&D team during measuring campaigns. The experienced engineering team supports investors and plant operators in every stage of their projects.

