Geothermal Well Design and Drilling

Objective

Drilling technology in geothermal is adopted from oil and gas drilling technology. Most of geothermal wells are designed following the same principles as those used in oil and gas industry. Although geothermal reservoir is similar to oil/gas reservoir, but the facts show that there are distinctions that could not be marginalized in geothermal well design.

The main challenges associated with geothermal drilling are related mostly to the hardness of igneous and metamorphic rocks being drilled, the high temperature of the formation (average temperature gradient for geothermal well is 12^{o} - 13^{o}F/100 ft or could be more) and the typically under-pressured strata.

This course will address the basic steps required by the geothermal well construction team (drillers, engineers, geoscientists) to develop a robust geothermal well plan. This course is focused on the fundamentals issues that must be addressed in the drilling plan and during well execution to insure safety and optimum performance. The course will deliver unmatched attention to early diagnostic trends of well problems and provide proactive preventive measures, a fundamental milestone to drilling optimization.

The participants will walk away from this course carrying a solid understanding of drilling planning, optimum execution strategies, and well informed on safety issues throughout the geothermal well construction process. In addition, the participant will appreciate the importance of team building and communication in the overall success of the drilling project. The course will include a healthy mix of fundamentals and contemporary state of the art drilling topics.

Who should attend?

Anyone who is connected with well construction from the planning phase to post mortem including drillers, engineers, geologists, geophysicists, and environmental engineers.

Course Deliverance

The course will be delivered using a mixture of power point presentation and heavy class participation.

Course Materials

1. First day - Planning and Management:

- Budget
- Schedule
- Licenses
- Human resources

2. Second day - Well construction considerations and baseline well specification

- Resource depth
- Lithological variation
- Reservoir creation & Reservoir production
- Reservoir intervention
- Casing setting depth
- Final total depth
- Lost circulation

3. Third day - Drilling design

- Drill string
- Drilling fluid
- Casing
- Cementing
- Bit
- Directional drilling
- Well control
- Well stability

4. Fourth day - Drilling operation

- Stuck pipe
- Completion
- Geomechanics
- Logging
- Well testing
- Integrated data analysis of drilling engineering coupled with reservoir engineering, production engineering and well integrity

5. Fifth day - Field trip

6. Sixth day – Guest lecture from GFZ German Research Centre for Geosciences