Geothermal Drilling and Completion (G558)

Tutor(s)

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Overview

This course covers fundamental aspects of geothermal drilling and completion engineering, highlighting the differences between conventional oil and gas and geothermal activities. It encompasses the main geothermal drilling characteristics, focusing on deep geothermal well construction and completion concepts. The course also covers conventional and unconventional geothermal technologies, addressing the need of drilling and completion challenges. The last part of the course will concentrate on well integrity aspects, ranging from existing oil and gas wells to built-for-purpose geothermal wells.

Duration and Logistics

Classroom version: A 3-day course comprising a mix of lectures, case studies and exercises. The manual will be provided in digital format and participants will be required to bring a laptop or tablet computer to follow the lectures and exercises.

Virtual version: Five 4-hour interactive online sessions presented over 5 days. A digital manual will be distributed to participants before the course. Some reading is to be completed by participants off-line.

Level and Audience

Advanced. The course is intended for geoscientists wishing to learn the engineering aspects of geothermal project implementation, and oil and gas professionals transitioning towards sustainable energy opportunities.

Objectives

You will learn to:

1. Identify key factors in streamlining geothermal project decision making processes.
2. Understand different management styles and their impacts on geothermal planning and execution.
3. Identify the uncertainties and risks associated with drilling geothermal wells.
4. Assess the impact of different well construction and completion concepts on the life of the well integrity.
5. Discuss and analyze case studies involving different geothermal well construction solutions.

Course Content

Course Details

This course will focus on geothermal well construction and completion covering the following topics

Session 1

- Introduction and course presentation
- Special aspects of geothermal drilling (conventional vs geothermal)
- Special drilling techniques for geothermal drilling (including geosteering for closed loop application)
- Mud design and well control for geothermal applications (effect of high temp on mud selection and well control needs)

Session 2

- Geothermal well cementing (high volume in high temperature regimes, cement loss, cement properties, long-term cement behavior)
- Alternative materials for well construction (to improve well thermal insulation or heat transfer)
- Overall heat transfer coefficient in wells and its implications in well design

Session 3

- Well completions for geothermal applications (what is different and why it is needed)
- Tubing selection – composite, vacuum-insulated tubing for BHE, tubing-less solutions
- Formation isolation fluids to allow closed loop without casing (cementless well construction)

Session 4

- Introduction to well integrity (current oil and gas standards, define leak, life of the well integrity)
- Well integrity of geothermal wells (what is different, why matters, well integrity for oil and gas conversions, doublet well integrity aspects)
- Casing design and material selection – composite, coated / relined, alternative solutions

Session 5

- Identification and solution of drilling problems associated with geothermal wells
- Selected case studies
- Discussions and take away points