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RESULTS FROM THE NEWBERRY VOLCANO EGS DEMONSTRATION PROJECT—2014

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The Future of Geothermal Energy (Enhanced Geothermal Systems)

An Enhanced Geothermal System (EGS) is created by pumping cold water into a deep geothermal well to create stress and fractures in the rock that can be used to make heat from the reservoir available. Economic success of EGS requires increasing flow rates per producer.

EGS Uses Hydroshearing (not hydrofracking)

Hydroshearing is a process of injecting a slurry of water and granular material into a deep geothermal well to pack off fractures taking fluid; these are mixed as a slurry in water. Hydroshearing can be performed as a complete Zonal Isolation Material (TZIM) or a composite TZIM for the creation of fractures.

Microscopic Monitoring Results

Thermally-degradable Zonal Isolation Materials (TZIM)

TZIMs are designed to provoke and maintain the activation of small fractures in EGS. TZIMs are designed to degrade given a specific temperature or time.

Pressure and Flow Rate During Stimulation

A Distributed Temperature Sensor (DTS) is shown on the image to the right. A DTS is a distributed sensor that is placed along the length of the hole which allows for the accurate measurement of temperature along its entire length. The graph on the right shows the step rate test conducted before going into stimulation. This image demonstrates how the reservoir is stimulated over the entire length of the wellbore.

Overview of the EGS Demonstration

EGS Demonstration:
- Deterministic technology and performance in EGS
- Establish at least 3 zones in existing low-permeable, impermeable formation
- Establish diverse technology for multiple reservoir applications
- Demonstrate single well test methods
- Thermochemical recovery of hydrocarbon EGS reservoir
- Predict economic outcomes of fracture permeability injection

Economic Success of EGS requires increasing flow rates per producer. A production rate of 500 bbls/day is a very good well (10,000 bbl/day) = $1,000,000 / day gross. A production rate of 300 gpm is a very good well (200 °C water) = 1 MWe = $5,000 / day gross. A production rate of 300 gpm is a poor geothermal well (300 °C water) = 1 MWe = $5,000 / day gross. Increasing flow rate per producer is a key factor in the economic success of EGS.

Stimulation Planning

Stimulation planning suggests that reservoir has been highly pressurized. The important thing to recognize on the graph on the right is the nearly linear pressure decline. This can be used to gauge the length of the hole which allows for the accurate measurement of temperature along its entire length. The graph on the right shows the step rate test conducted before going into stimulation. This image demonstrates how the reservoir is stimulated over the entire length of the wellbore.

DTS Stimulation Monitoring

A Distributed Temperature Sensor (DTS) is shown on the image to the right. A DTS is a distributed sensor that is placed along the length of the hole which allows for the accurate measurement of temperature along its entire length. The figure on the right shows DTS measurements over the entire time of the 2014 stimulation. Data collected from the DTS included monitoring wellness data, which is stored in the casing and used for the accurate measurement of temperature along the entire length of the wellbore. Data collected from the DTS included monitoring wellness data, which is stored in the casing and used for the accurate measurement of temperature along the entire length of the wellbore. Data collected from the DTS included monitoring wellness data, which is stored in the casing and used for the accurate measurement of temperature along the entire length of the wellbore.