Hydraulic Fracturing at the Olympic Dam Geothermal Energy Project

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ABSTRACT

Australia's first mini hydraulic-fracturing program of a hot granite in a slim hole was carried out early this year by Green Rock Energy Limited at its Olympic Dam Engineered Geothermal System (EGS) Project. The viability of EGS projects are critically dependant on being able to establish a sufficient water flow rate through fractures in the hot granites between injection and production wells. Success depends on the capacity to successfully engineer by fracture stimulation a network of sustainable permeable fractures connecting the wells in the granite. The mini hydraulic-fracturing program was undertaken in Blanche No 1 well drilled to a depth of 1.935 km. This was done in order to provide the engineering data and confidence required before undertaking the more expensive drilling and fracture stimulation program to connect the injection and production wells by opening fractures at the greater depths where the granites are hotter.

The mini hydraulic fracturing was undertaken by GEO-Meß-Systeme GmbH of Germany using their crew and specialised equipment in conjunction with Australia's CSIRO. Thirteen hydraulic fracturing stress measurements were carried out in Blanche No 1.

Fractures were successfully opened in the hot granites by the hydraulic fracture tests. Results confirm that the *in-situ* stress regime towards the bottom of Blanche No 1 has high horizontal stresses and the minimum principal stress is the vertical stress. This indicates that the creation of horizontal fractures will be favoured during stimulation operations at production depths, and that the required operating pressures to open the fractures should be in the order of the minimum principal stress. This supports the earlier work undertaken by the CSIRO in which they concluded ".....that hydraulic fracture orientation and fluid flow in a stimulated zone are most likely to be in a sub-horizontal direction. This is an ideal situation for generating an optimal heat exchange reservoir that would allow a maximum distance between injection and production wells.

Data from the mini hydraulic fracturing are being used for design of the deep injection and production wells and the fracture stimulation program.