

INJECTION TESTING FOR AN ENHANCED GEOTHERMAL SYSTEM PROJECT AT DESERT PEAK, NEVADA

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ABSTRACT

An Enhanced Geothermal System (EGS) project, partially funded by the U.S. Department of Energy, is under development at the Desert Peak field in Nevada. For this project, an existing non-commercial well (DP 23-1), to be stimulated by hydraulic fracturing, has been the subject of various recent investigations. One focus of this work has been an evaluation of the existing network of fractures in the well via acquisition of a wellbore-imaging log, which required cooling the wellbore (by water injection) to ensure good image quality. This cooling effort provided an opportunity to conduct an injection test of the well.

A step-rate injection test and a pressure fall-off test, following the stoppage of injection, were conducted. The injection rate and pressure data were analyzed using transient pressure analysis techniques. This analysis confirmed that the reservoir around the well has very low flow capacity (4,000 md-ft) and a modest storage capacity (0.001 ft/psi), and the well does not intersect any major fracture. The well has very low injectivity (0.69 gpm/psi). The analysis indicates that injection for several days reduced the wellbore "skin factor" (from 1 to -0.2), and thereby, improved the injectivity somewhat. The positive skin factor of this well appears to be due to possible well damage and the fact that less than half of the open interval in the well accepts injection. The average porosity of the reservoir is very low (on the order of 2%). The radius of investigation of the test was estimated at 1,440 feet. The flow and storage capacities at this well are far lower than encountered within the known hydrothermal reservoir at Desert Peak.

The results of this test provide a baseline against which any future permeability enhancements at this well can be assessed; a practical, low cost and approximate methodology for such assessment is proposed. The methodology consists of a short-term injection test followed by a long-term test (several weeks) that will yield the following measures of stimulation success: increase in injectivity, flow capacity and/or fracture length; reduction in skin factor; and stimulated reservoir volume.

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