

# **ADVANCES IN MULTIPLE-LEGGED WELL COMPLETION METHODOLOGY AT THE GEYSERS GEOTHERMAL FIELD, CALIFORNIA**

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## ***Key Words:***

*Geysers, drilling, multiple-legged wells, forked wells, Aidlin project*

## **ABSTRACT**

Drilling or recompletion of production wells with two or more producing wellbores is a technique that has been used successfully by several operators in the southwestern part of the Geysers field to increase well productivities and decrease the unit cost of steam production. The northwestern part of the field poses special difficulties for drilling multiple-legged or "forked" wells, because of greater reservoir depth, higher reservoir temperatures, the need for narrower well completions, and less stable rock conditions.

Three wells within the Aidlin project area of the northwest Geysers were recompleted as 2- and 3-legged producers during 1992-1993, using both existing and new methods for coping with the conditions in this part of the field. Total drilled depths of the producing legs were as much as 11,345 feet (3,458 m), and kickoff points were as deep as 7,895 feet (2,405 m) from 9-5/8-inch production casings. Reservoir temperatures in directionally drilled intervals reached in excess of 600°F (315°C).

Drilling problems related to the challenging conditions were experienced, and were resolved by a combination of preventive and remedial measures, particularly in directional drilling techniques and the treatment of circulation losses and poorly cemented casings. The drilling of the additional legs resulted in an average increase of 58% over the original well productivities, making the technique cost-effective in spite of the associated problems and risks. Improvements in drilling technology, particularly in high-temperature directional drilling equipment, could further improve the viability of deep and hot multiple-legged wells.

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