

# **A FIELD-WIDE NUMERICAL SIMULATION MODEL OF THE GEYSERS GEOHERMAL FIELD, CALIFORNIA, USA**

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## **ABSTRACT**

The Geysers geothermal field is the largest developed geothermal system in the world. The total installed capacity is presently 2,056 MW although actual production in early 1994 was estimated to be only 1,200 MW(net). The inability to produce at higher generation levels is due to the significant pressure decline that has occurred within the reservoir, particularly since the mid-1980's.

In 1992, a comprehensive field-wide numerical simulation model of The Geysers field was completed, based on drilling, well-test and production data provided by four of the five major field operators. The numerical simulation model was originally developed by UNOCAL, based primarily on data from the UNOCAL-NEC-Thermal (U-N-T) lease areas, and was extended in this study to incorporate data from the other operators.

The expanded model was successfully calibrated by matching the responses of individual observation wells and changes in field-wide isobaric maps to 30 years of production history.

Forecast runs were conducted using the calibrated model to calculate the reservoir response for two possible production scenarios: maintaining wellhead pressures constant at their 1991 levels and reducing wellhead pressure by up to 40 psi (0.28 MPa) over the next five years.

With the reduction in wellhead pressure, an additional 1 million lbs/hr (453 tons/hour) of steam can be produced over the next ten years; equivalent to 55 MW(net) additional power production.

However, overall field production will continue to decline from the present level of approximately 20 million lbs/hr (9,100 tons/hour) to 8.5 million lbs/hr (3,850 tons/hour) by the year 2014; equivalent to a reduction in overall power production from the present level of 1,200 MW(net) to 475 MW(net).

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